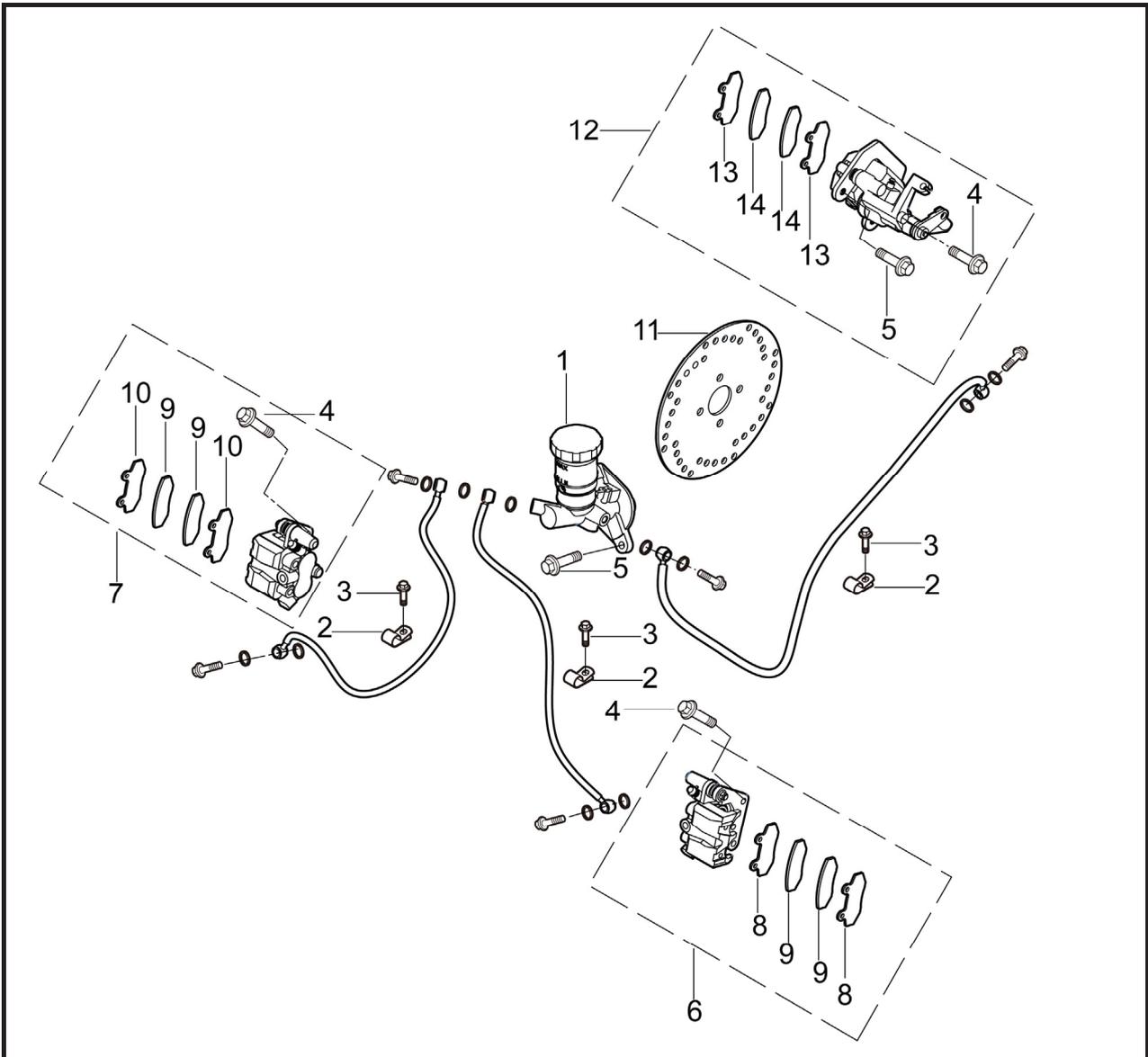


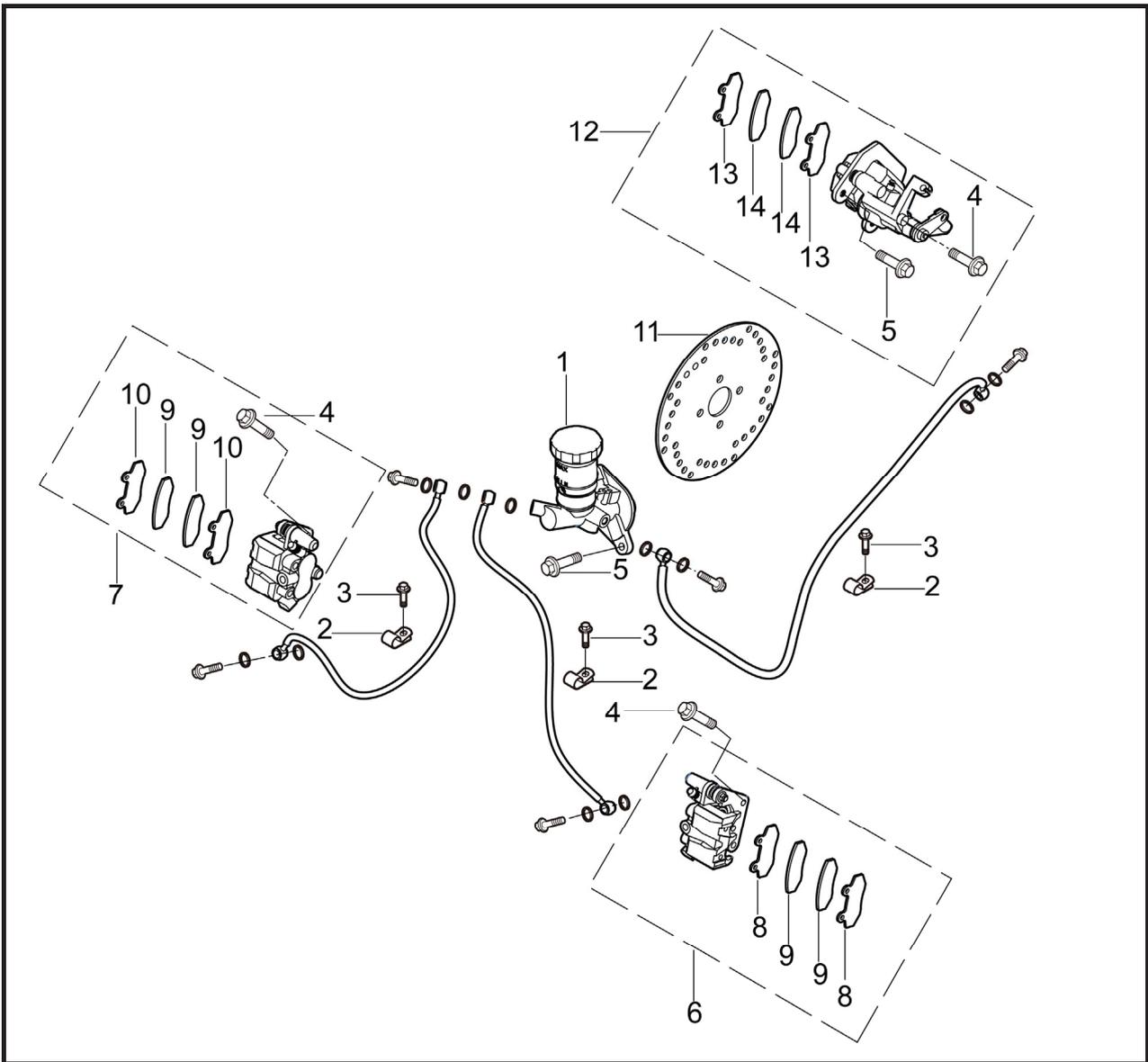
CHASSIS

Front and Rear Disk Brake Parts



Removing the disk brake parts			
1	Auxiliary bumper	1	
2	Cable Clip	5	
3	Hexagon flange bolt M6×16	5	
4	Hexagon flange self-locked nut M8×25	6	
5	Hexagon flange self-locked nut M8×30	4	
6	Front left brake caliper	1	
7	Front right brake caliper	1	
8	Front left outer brake pad assy.	2	
9	Front inner brake pad assy.	4	

CHASSIS



10	Front right outer brake pad assy.	2	
11	Braking plate	1	
12	Rear brake caliper assy.	1	
13	Rear outer brake pad assy.	2	
14	Rear inner brake pad assy.	2	

CHASSIS

CHECKING THE FRONT BRAKE DISC

1. Check:

- brake disc

Galling/damage → Replace.

2. Measure:

- brake disc deflection

Out of specification → Check the wheel runout.

If wheel runout is within the limits, replace the brake disc.

Brake disc maximum deflection

0.10 mm (0.004 in)

- brake disc thickness ①

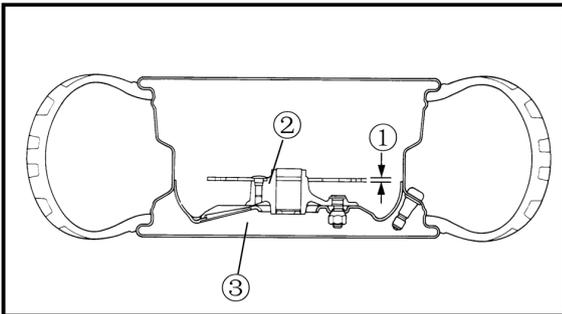
- wheel hub ②

- wheel tyre ③

Out of specification → Replace.

Brake disc minimum thickness

3.0 mm (0.12 in)



NOTE:

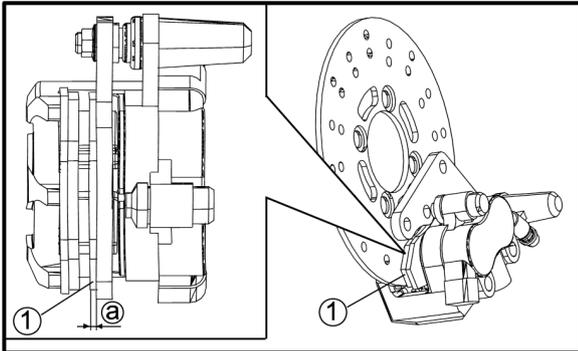
Apply the locking agent to the 30Nm bolt with screw down.

CHASSIS

REPLACING THE FRONT BRAKE PADS

NOTE:

It is not necessary to disassemble the brake caliper and brake hose to replace the brake pads.



1. Check:

- brake pad ①
Damage/wear → Replace

2. Measure:

- brake pad thickness ①
Out of specification → Replace the brake pads as a set.

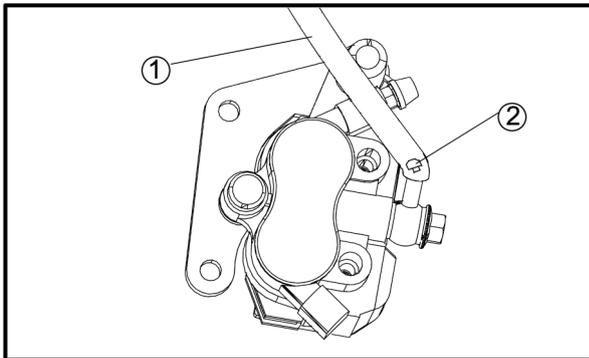
Brake pad wear limit
1.5 mm (0.06 in)

3. Install:

- brake pads
- brake pad spring

NOTE:

Always install new brake pads and brake pad spring as a set.



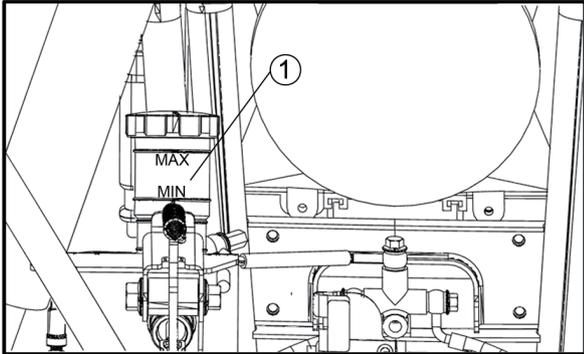
- Connect a suitable hose ① tightly to the brake caliper bleed nozzle ②. Put the other end of this hose into an open container.
- Loosen the brake caliper bleed screw and, using a finger, push the caliper piston into the brake caliper.
- Tighten the brake caliper bleed screw.

Brake caliper bleed screw
6 Nm (0.6 m · kg, 4.3 ft · lb)

- Install the retaining bolts and brake caliper.

Brake pad holding bolt
18Nm (1.8 m · kg, 13 ft · lb)

CHASSIS



4. Check:
 - brake fluid level
 - minimum level mark ①

Must use DOT4 Brake Fluid

5. Check:
 - brake pedal operationSoft or spongy feeling → Bleed the brake system.

DISASSEMBLING THE FRONT BRAKE CALIPERS

WARNING:

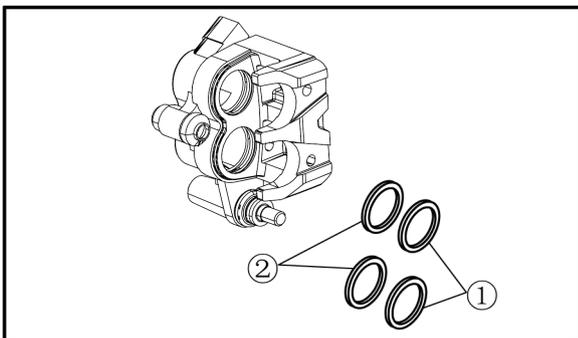
- *Brake caliper is one of the most important security components. Disassembly and maintenance must have a rich experience in technology and complete tool.*
- *Wrong disassembly and reassembly may cause serious injury and even death. Replace damaged brake caliper.*
- *If only replace the brake caliper of one side, please check carefully whether the braking force of right and left are balance and equal.*

1. Remove:
 - brake caliper pistons
 - dust seals ①
 - caliper piston seals ②

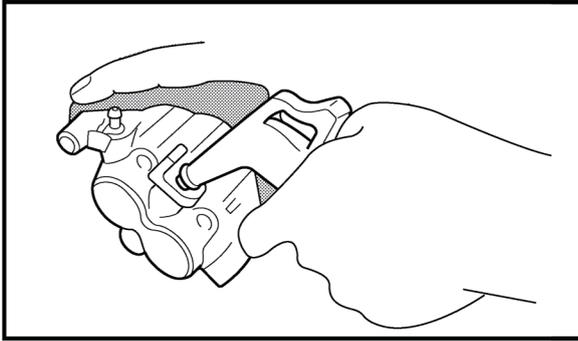
- a. Blow compressed air into the hose joint opening to force out the caliper piston from the brake caliper body.

WARNING:

- *Never try to pry out a caliper piston.*
- *Cover the caliper piston with a rag. Be careful not to get injured when the piston is expelled from the caliper cylinder.*



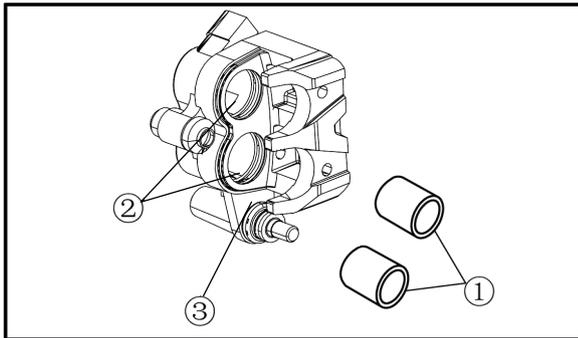
CHASSIS



b. Remove the dust seals and caliper piston seals.

WARNING: _____

All internal brake components should be cleaned in new brake fluid only. Do not use solvents as they will cause seals to swell and distort.



2. Check:

- brake caliper pistons ①
Scratches/rust/wear → Replace the brake caliper assembly.
- brake caliper cylinders ②
Wear/scratches → Replace the brake caliper assembly.
- brake caliper body ③
Cracks/damage → Replace.
- brake fluid delivery passage (brake caliper body)
Blockage → Blow out with compressed air.

WARNING: _____

Replace the caliper piston seals and dust seals whenever the brake caliper is disassembled.

CHASSIS

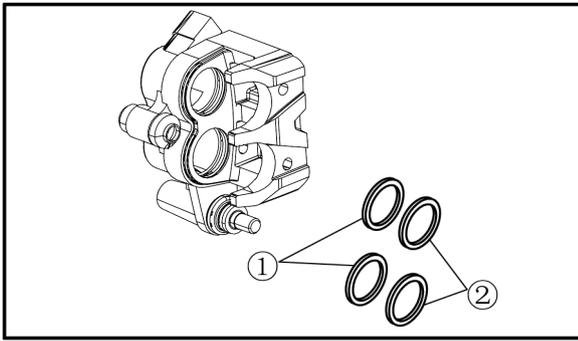
ASSEMBLING THE FRONT BRAKE CALIPERS

WARNING:

• *All internal brake components should be cleaned and lubricated with new brake fluid only before installation.*

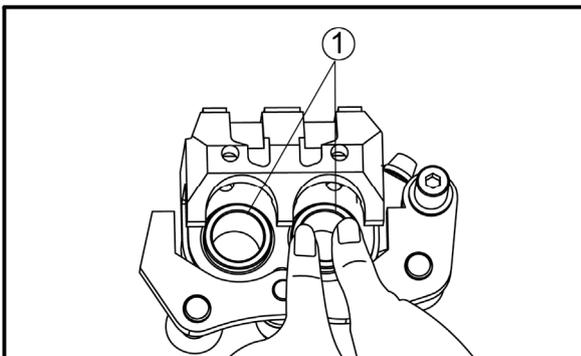
Must use DOT4 Brake Fluid

• *Replace the caliper piston seals and dust seal whenever a brake caliper is disassembled.*



1. Install:

- caliper piston seals ①
- dust seals ②



2. Install:

- brake caliper pistons ①

INSTALLING THE FRONT BRAKE CALIPERS

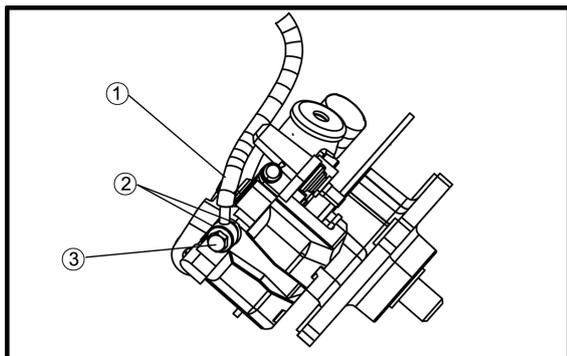
The following procedure applies to both of the front brake calipers.

1. Install:

- brake caliper assembly
- bolt flange

48Nm (4.8m · kg, 35 ft · lb)

- brake hose ①
- copper washers ②
- union bolt ③



CHASSIS

NOTE: _____

When installing the brake hose on the brake caliper, make sure that the brake pipe touches the projection a on the brake caliper.

WARNING: _____

Proper brake hose routing is essential to insure safe vehicle operation.

2. Fill:

- brake reservoir

Must use DOT4 Brake Fluid

NOTE: _____

Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

3. Air bleed:

- brake system

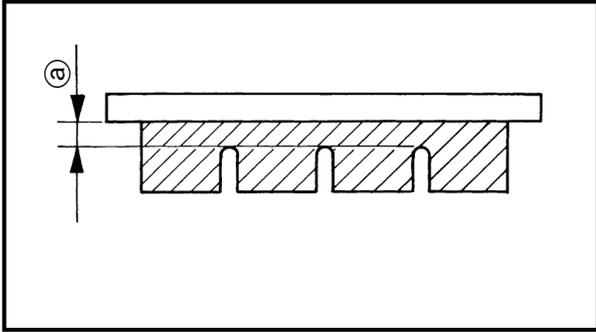
4. Check:

- brake fluid level

Brake fluid level is below the "LOWER" level line

→ Add the recommended brake fluid to the proper level.

CHASSIS



REPLACING THE REAR BRAKE PADS

1. Measure:

- brake pad wear limit ③

Out of specification → Replace the brake pads as a set.

Brake pad wear limit
1.5 mm (0.06 in)

2. Install:

- brake pads
- brake pad spring

NOTE:

Always install new brake pads, new brake pad shims, new insulators, and a new brake pad spring as a set.

3. Check:

- brake fluid level

4. Check:

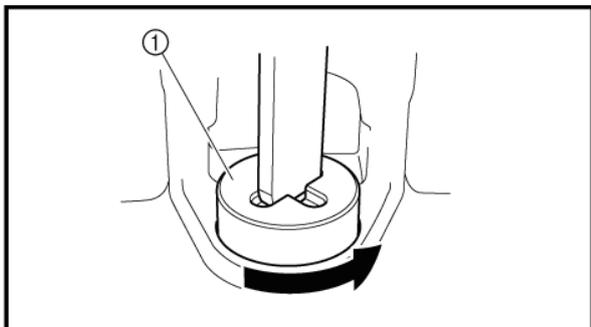
- brake pedal operation

Soft or spongy feeling → Bleed the brake system.

DISASSEMBLING THE REAR BRAKE CALIPER

WARNING:

- ***Brake caliper is one of the most important security components. Disassembly and maintenance must have a rich experience in technology and complete tool.***
- ***Wrong disassembly and reassembly may cause serious injury and even death. Replace damaged brake caliper.***
- ***If only replace the brake caliper of one side, please check carefully whether the braking force of right and left are balance and equal.***



1. Remove:

- brake caliper piston ①
- dust seal ②
- caliper piston seal ③

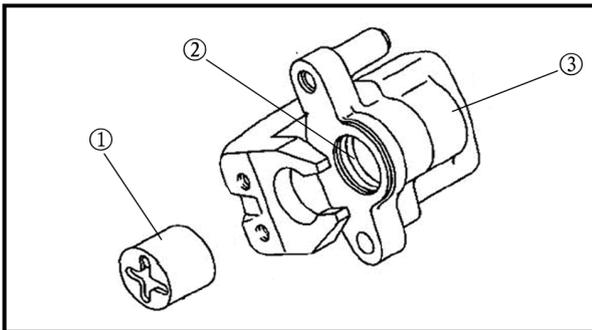
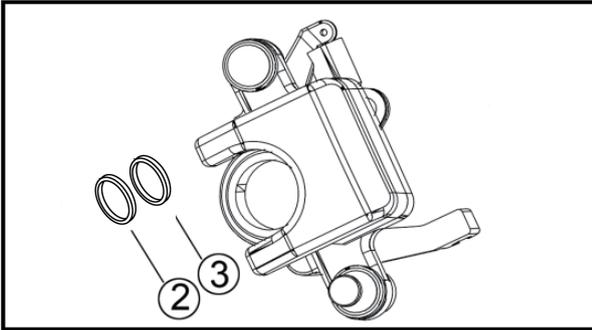
a. Turn the brake caliper piston counterclockwise to remove it.

CHASSIS

b. Remove the dust seal and caliper piston seal.

WARNING:

All internal brake components should be cleaned in new brake fluid only. Do not use solvents as they will cause seals to swell and distort.



1. Check:

- brake caliper pistons ①
Scratches/rust/wear → Replace the brake caliper assembly.
- brake caliper cylinders ②
Wear/scratches → Replace the brake Caliper assembly.
- brake caliper body ③
Cracks/damage → Replace.
- brake fluid delivery passage (brake caliper body)
Blockage → Blow out with compressed air.

WARNING:

Replace the caliper piston seals and dust seals whenever the brake caliper is disassembled.

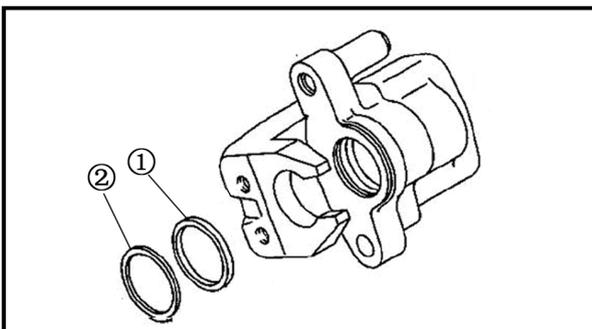
ASSEMBLING THE REAR BRAKE CALIPER

WARNING:

- *All internal brake components should be cleaned and lubricated with new brake fluid only before installation.*

Must use DOT4 Brake Fluid

- *Replace the caliper piston seal and dust seal whenever a brake caliper is disassembled.*



1. Install:

- caliper piston seal ①
- dust seal ②

2. Install:

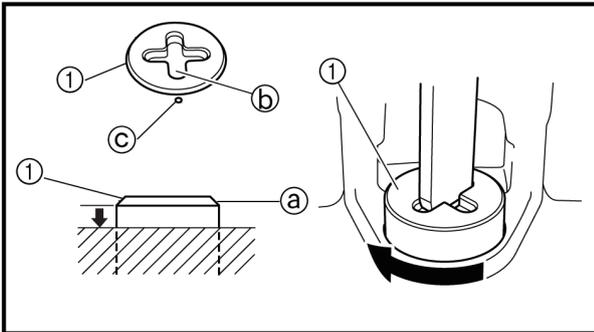
CHASSIS

- brake caliper piston

Turn the brake caliper piston clockwise until section a of the brake caliper piston is level with the surface of the brake caliper body.

NOTE:

Align an end ⑥ of the groove in the brake caliper piston with the punch mark ③ on the brake caliper body.



3. Install:

- gasket ①
- rear brake case ②
- rear brake case bolts ③

22Nm (2.2 m · kg, 16 ft · lb)

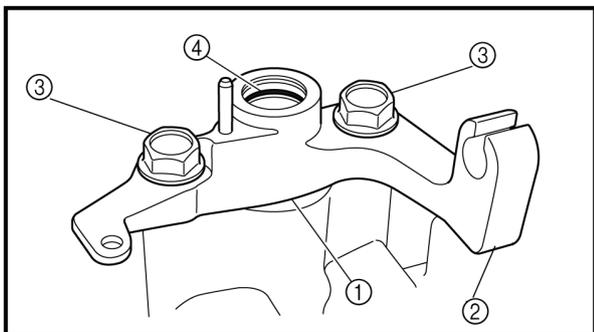
- O-ring ④

4. Install:

- rear brake arm shaft ①
- rear brake arm ②
- set bolt ③
- rear brake arm nut ④

NOTE:

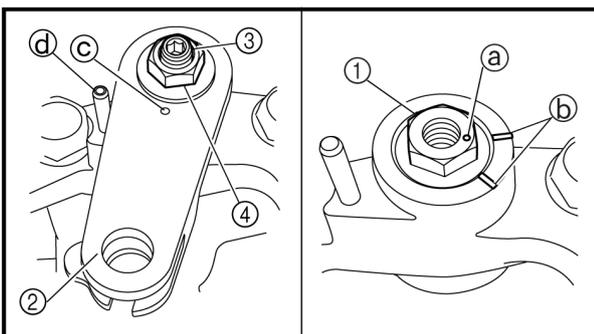
Apply lithium-soap-based grease to the rear brake arm shaft and set bolt.



- a. Screw in the rear brake arm shaft counterclockwise completely so that the punch mark ③ on the rear brake arm shaft is between the alignment marks ⑥.

NOTE:

The hole for the rear brake arm shaft has multiple threads. If the punch mark ③ on the rear brake arm shaft is not between the alignment marks ⑥ when the rear brake arm shaft is screwed in completely, remove the rear brake arm shaft and screw it in from a different starting position.



- b. Turn the rear brake arm shaft approximately 60° clockwise.
c. Install the rear brake arm to the rear brake arm

CHASSIS

shaft so that the punch mark ③ on the rear brake arm is aligned with the punch mark ① on the rear brake arm shaft.

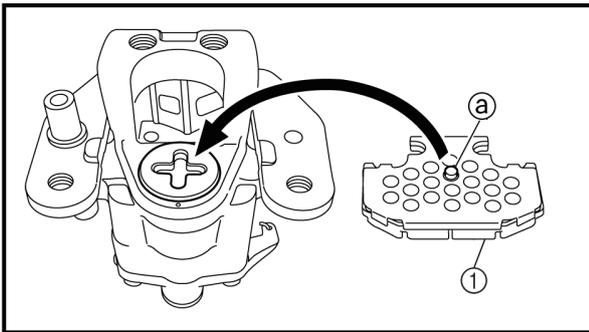
- d. Turn the rear brake arm until it contacts the pin ④.
- e. Finger tighten the set bolt.
- f. Tighten the rear brake arm nut.

5. Install:

- brake pad (piston side) ①
(with insulator and pad shim)

NOTE:

Align the projection a on the piston side of the brake pad with the groove in the brake caliper piston.



6. Install:

- brake pad holding bolts

17Nm (1.7 m · kg, 12 ft · lb)

INSTALLING THE REAR BRAKE CALIPER

1. Install:

- brake caliper assembly
- brake caliper mounting bolts

40Nm (4.0m · kg, 29 ft · lb)

- brake hose ①
- copper washers
- union bolt ②

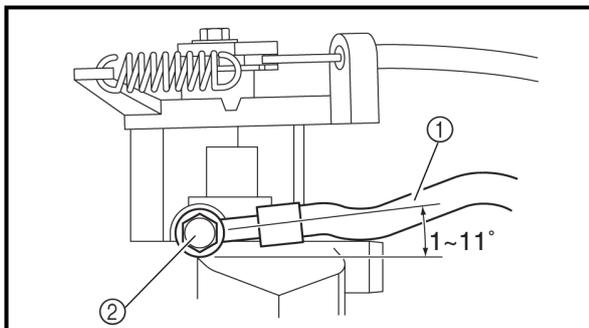
48Nm (4.8m · kg, 35 ft · lb)

NOTE:

Tighten the union bolt while holding the brake hose as shown.

WARNING:

Proper brake hose routing is essential to insure safe vehicle operation.



2. Fill:

- brake reservoir

Must use DOT4 Brake Fluid

CHASSIS

NOTE:

Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

3. Air bleed:

- brake system

4. Check:

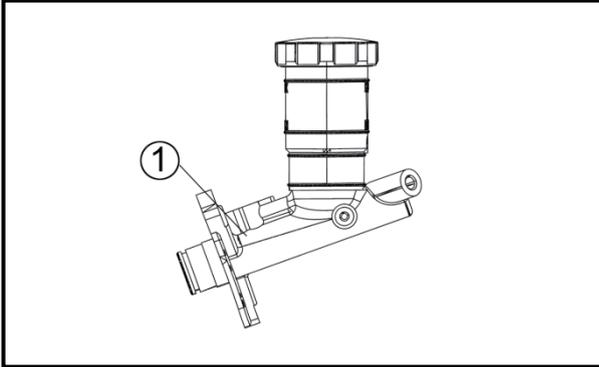
- brake fluid level

Brake fluid level is below the "MIN" level line → Add the recommended brake fluid to the proper level.

5. Adjust:

- rear brake cable free play

CHASSIS



CHECKING THE MASTER CYLINDER

1. Check:

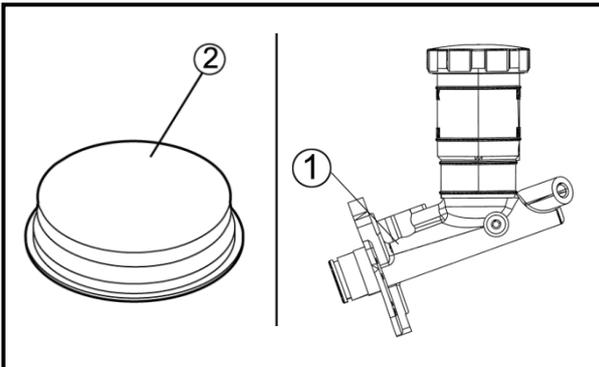
- brake master cylinder ①
Wear/scratches → Replace the brake master cylinder assembly.
- brake master cylinder body
Cracks/damage → Replace.
- brake fluid delivery passage (brake master cylinder body)
Blockage → Blow out with compressed air.

2. Check:

- brake master cylinder kit
Scratches/wear/damage → Replace as a set.

3. Check:

- brake fluid reservoir ①
- brake fluid reservoir diaphragm ②
Cracks/damage → Replace.



ASSEMBLING THE BRAKE MASTER CYLINDER

WARNING:

- *All internal brake components should be cleaned and lubricated with new brake fluid only before installation.*

Must use DOT4 Brake Fluid

- *Whenever a master cylinder is disassembled replace the piston seals and dust seals.*

CHASSIS

INSTALLING THE BRAKE MASTER CYLINDER

1. Install:

- brake master cylinder

16Nm (1.6 m · kg,11 ft · lb)

2. Install:

- brake pipe

19Nm (1.9 m · kg,13 ft · lb)

- washer plate
- brake hose
- union bolt

27Nm (2.7 m · kg,19 ft · lb)

3. Fill:

- brake fluid reservoir

Must use DOT4 Brake Fluid

NOTE:

Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

4. Air bleed:

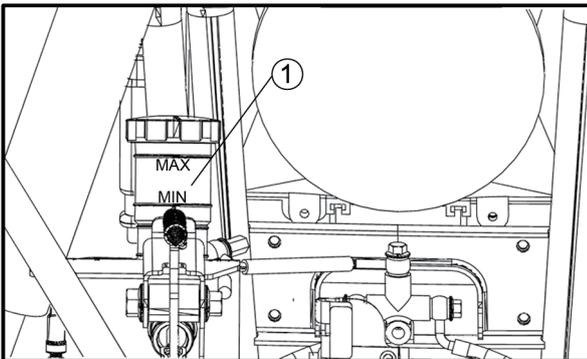
- brake system

5. Check:

- brake fluid level

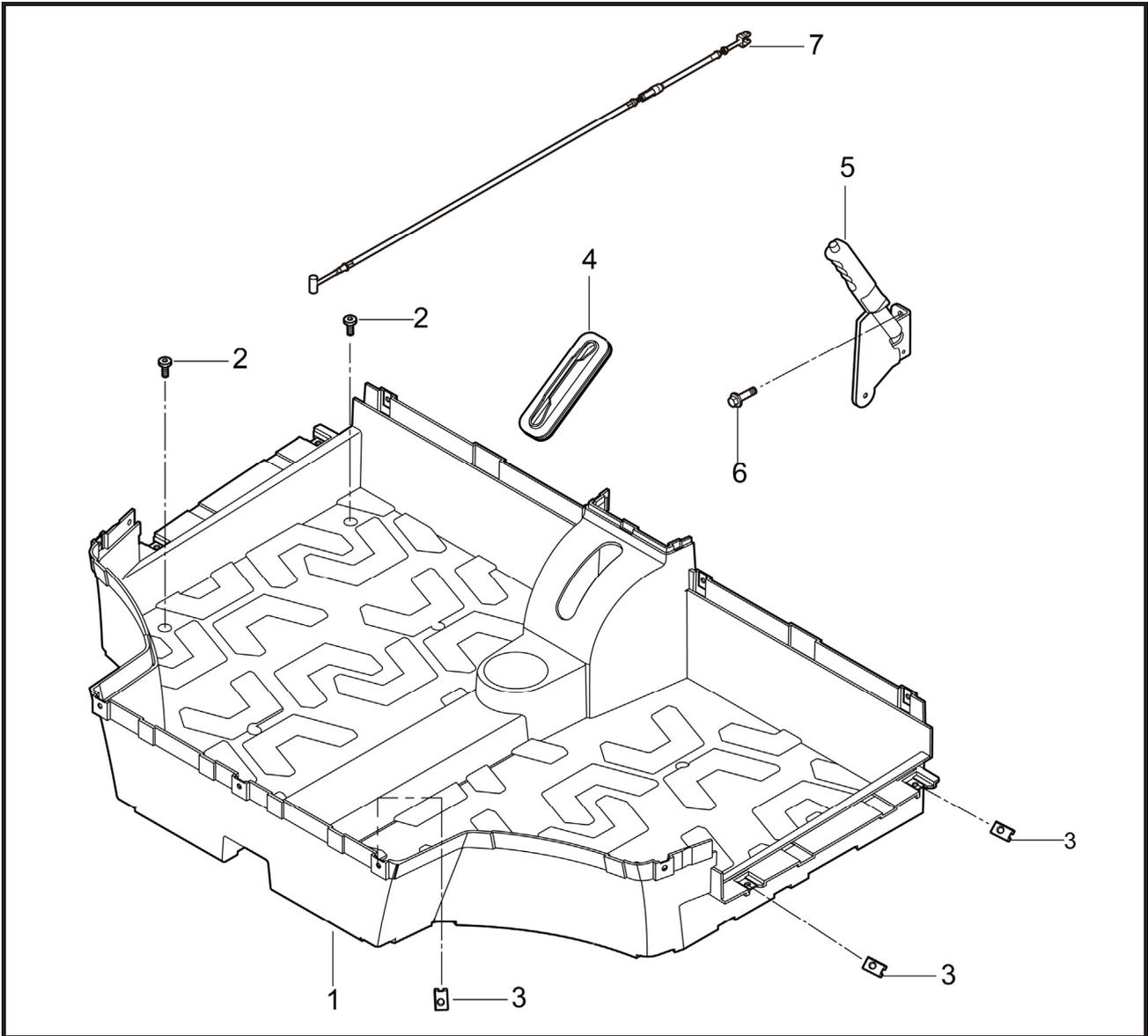
Brake fluid level is under the “MIN” level line

Fill up.



CHASSIS

FOOTREST PART

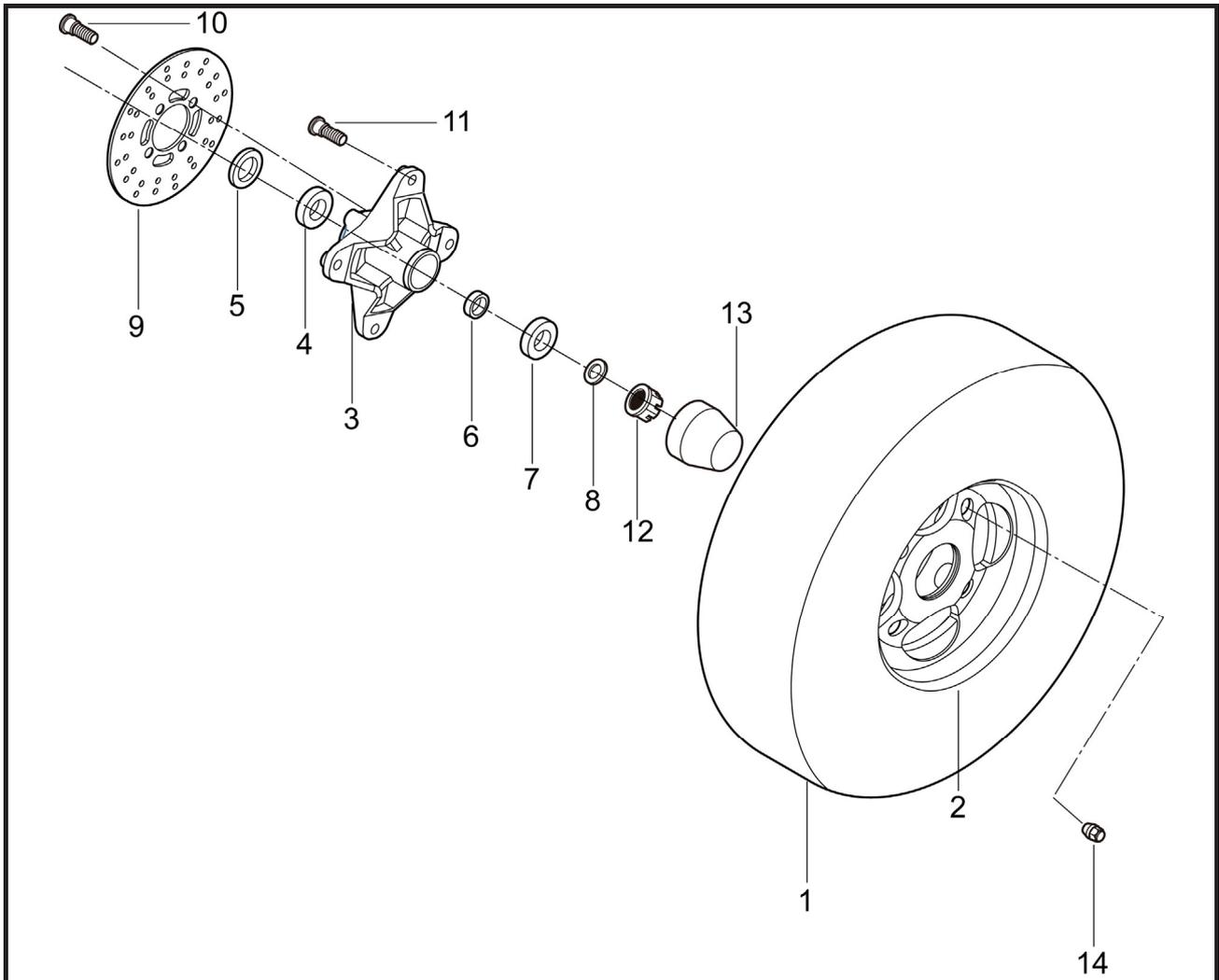


No.	Part Name	Qty	Remarks
	Removing the footrest part		
1	Footrest protector	1	
2	Socket hexagon flat head screws M6×16	8	
3	Clip for bolt M6×2	9	
4	Dust sleeve, parking pedal	1	
5	Parking system	1	
6	Hexagon flange bolt M8×16	2	
7	Parking cable	1	

CHASSIS

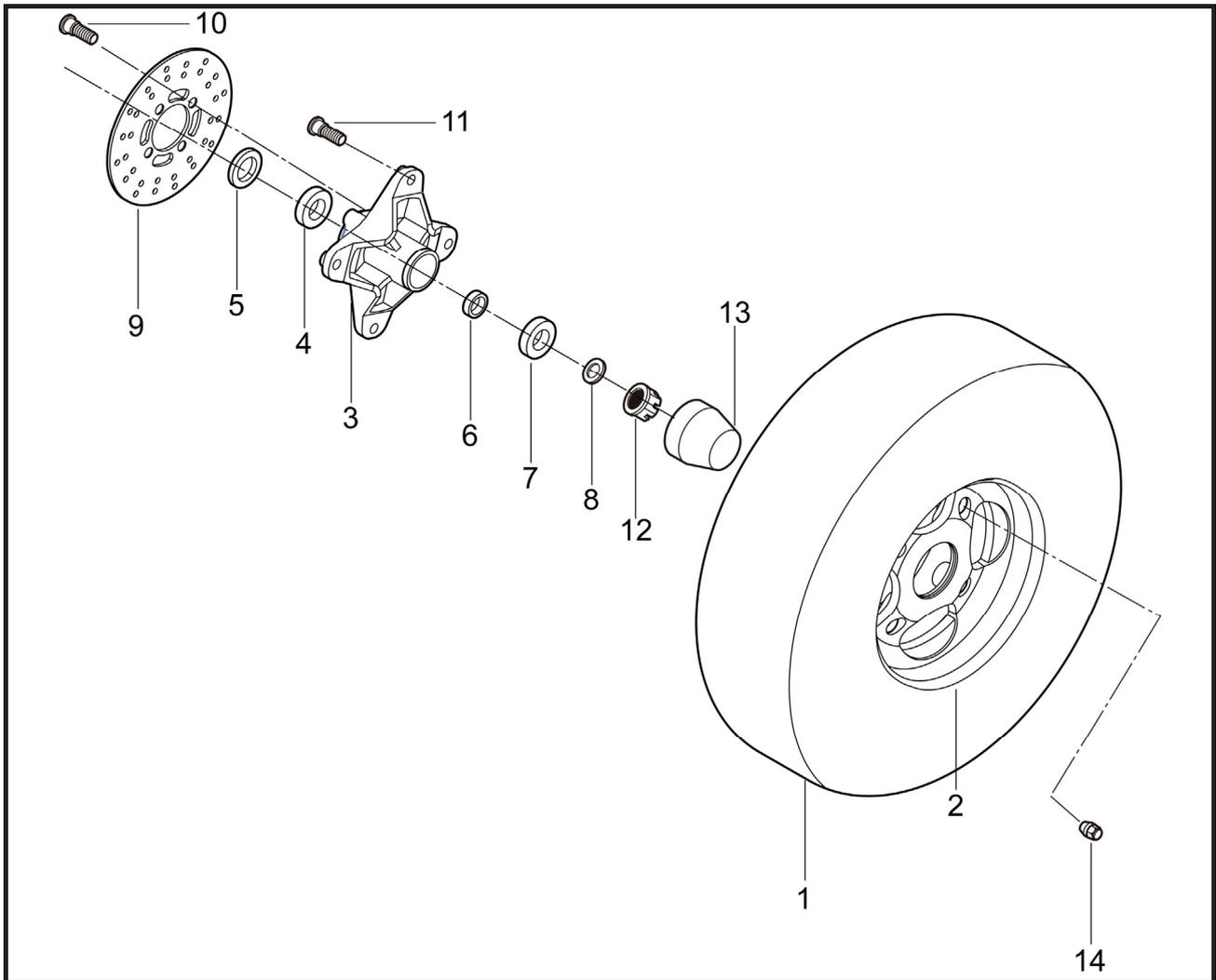
WHEEL AND TYRE PARTS

FRONT WHEELS



No.	Part Name	Qty	Remarks
	Removing the front wheel		
1	Front tyre	2	
2	Front wheel rim	2	
3	Front hub	2	
4	Bearing 6004-RZ	2	
5	Front steering knuckle oil seal	2	
6	Inner bushing I	2	
7	Bearing 6202-RS	2	
8	Oil Seal, front knuckle $\Phi 23 \times \Phi 35 \times 7$	2	
9	Front brake pad	2	
10	Hexagon step bolt M8×15-Φ15×5	8	
			<p>WARNING:</p> <p><i>Securely support the vehicle so There is no danger of it falling over.</i></p>

CHASSIS

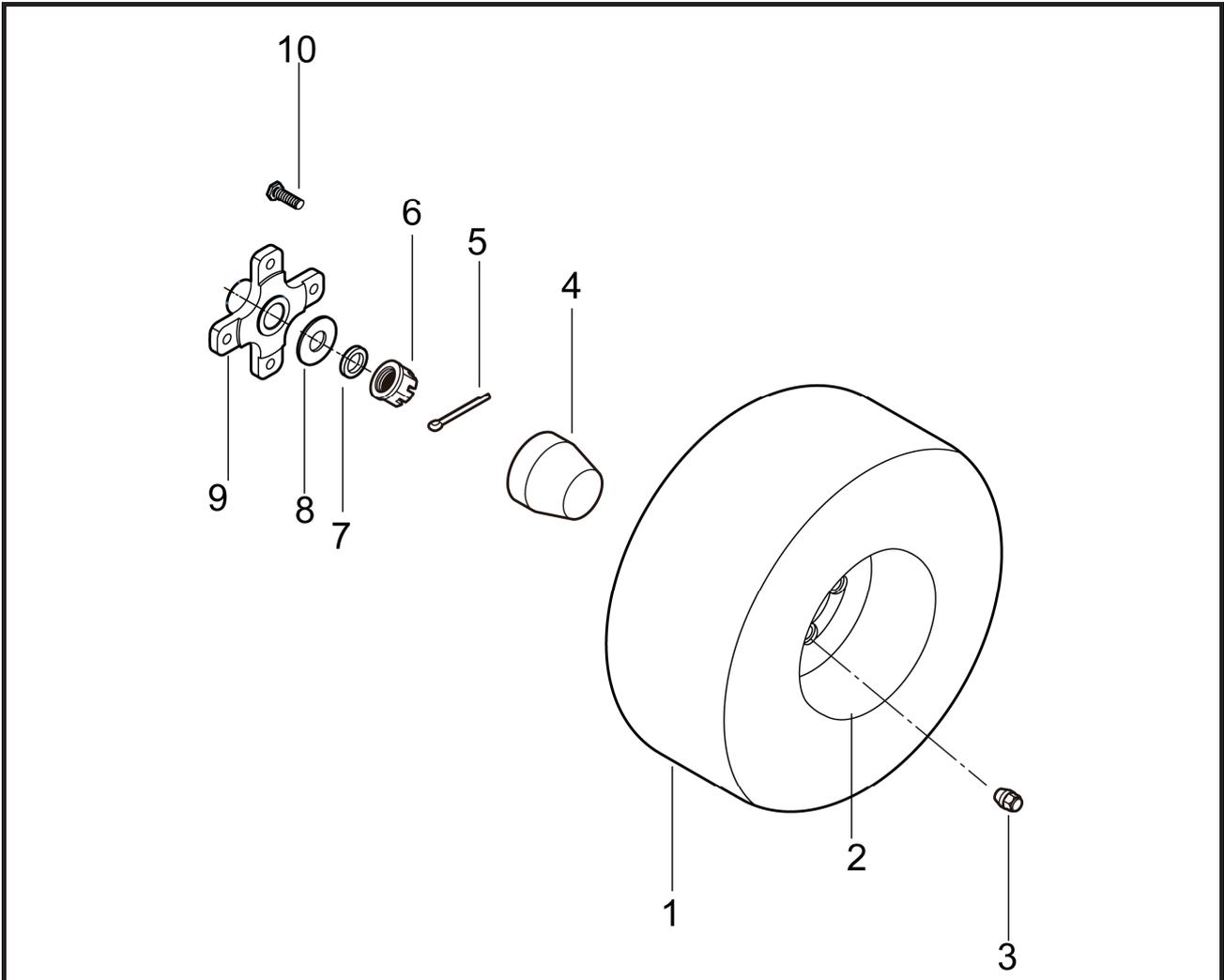


No.	Part Name	Qty	Remarks
11	Bolt	8	
12	Nut	2	
13	Wheel decoration cover	2	
14	Nut M10	8	

WARNING:
*Securely support the vehicle so
 There is no danger of it falling over.*

CHASSIS

REAR WHEELS

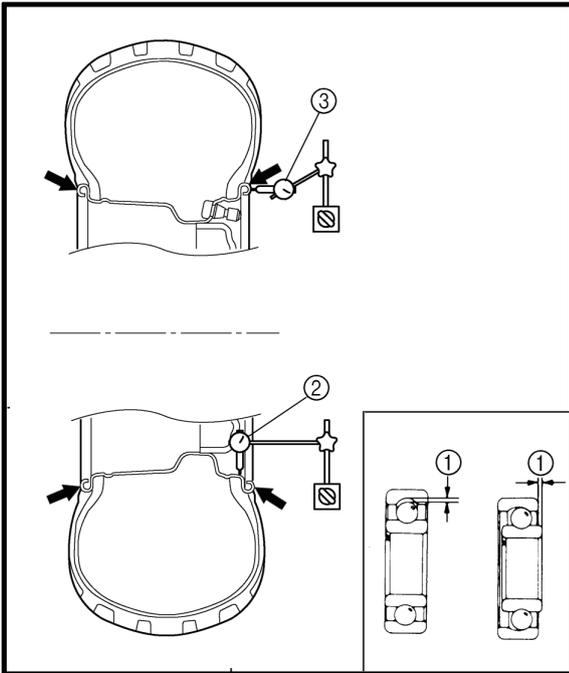


No.	Part Name	Qty	Remarks
	Removing the rear wheel		
1	Rear tyre	2	
2	Rear wheel rim	2	
3	Nut M10	8	
4	Wheel decoration cover	2	
5	Pin 2.5×60	2	
6	Nut M20×1.5	2	WARNING:
7	Spring washer Φ20	2	<i>Securely support the vehicle so</i>
8	Washer Φ20×Φ42×4	2	<i>There is no danger of it falling over.</i>
9	Front hub	2	
10	Bolt	2	

CHASSIS

CHECKING THE WHEEL TYRE

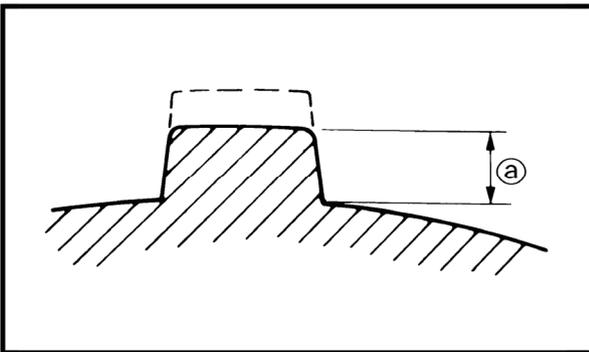
1. Check:
 - wheel tyre
2. Measure:
 - wheel runout
 - Over the specified limit → Replace the wheel or check the wheel bearing play ①.
3. Check:
 - wheel balance
 - Out of balance → Adjust.



Wheel runout limit
Radial ②: 2.0 mm (0.08 in)
Lateral ③: 2.0 mm (0.08 in)

WARNING:

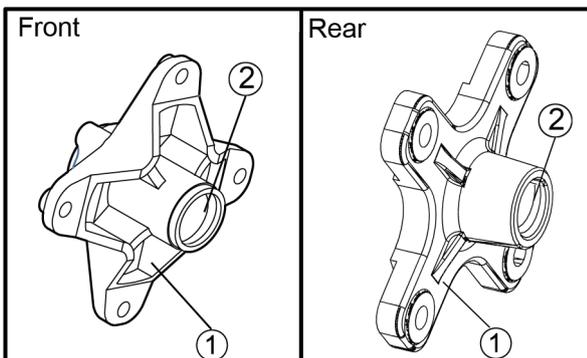
The profile depth falls below 3mm, Please replace the tyre immediately.



- tyre wear limit ①

CHECKING THE WHEEL HUB

1. Check:
 - wheel hub ①
 - Cracks/damage → Replace.
 - nuts (wheel hub)
 - loosen or distorted → Replace or tighten



CHASSIS

INSTALLING THE WHEEL HUB

1. Install:
 - axle nut

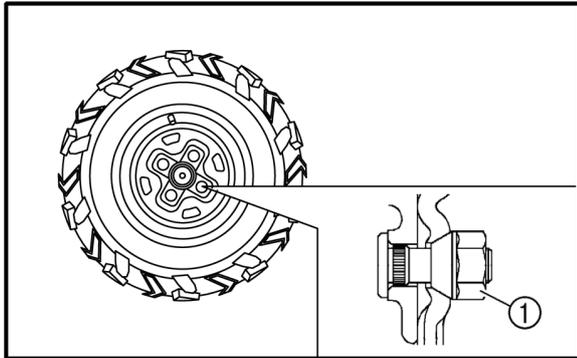
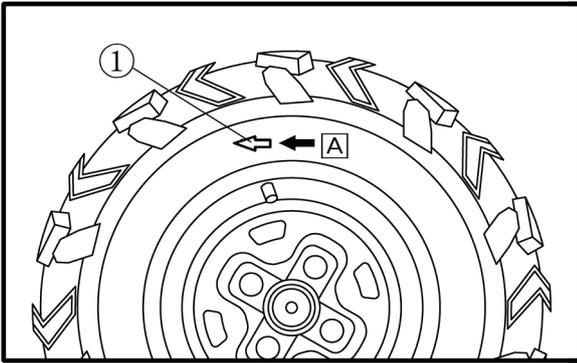
260 Nm (26.0 m · kg, 190 ft · lb)

INSTALLING THE WHEEL TYRE

1. Install:
 - wheel

NOTE:

The arrow mark ① on the tyre must point in the direction of rotation A of the wheel.



2. Tighten:

- wheel nuts ①

The angle of the conical bores is 60°

WARNING:

Tapered wheel nuts ① are used for both the front and rear wheels. Install each nut

CHASSIS

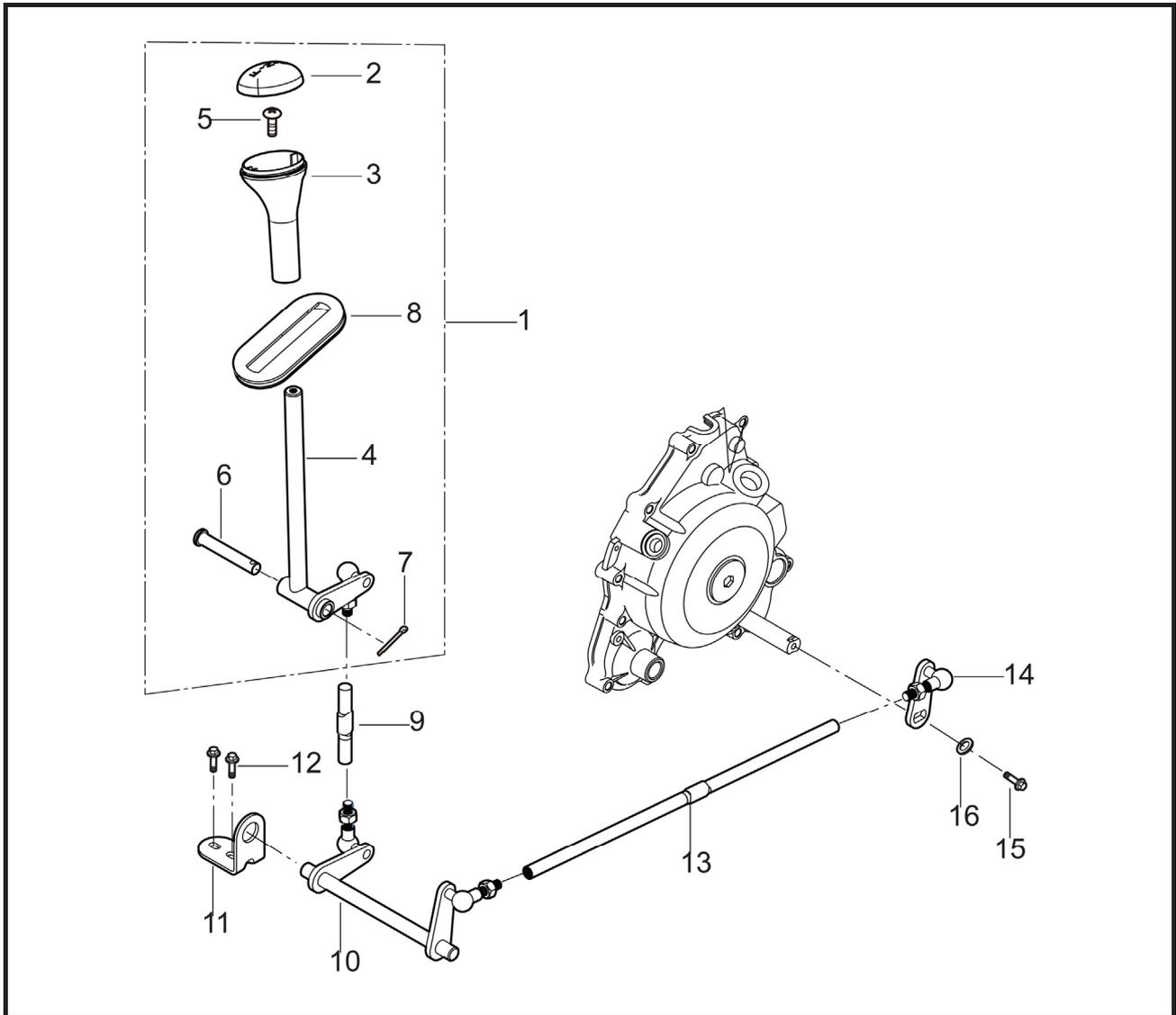
SPECIFICATION OF WHEEL AND TYRE

	Wheel hub Dimension	Tyre Dimension	Tyre Pressure (Kpa /PSI)
Front Wheel	10×5.0 AT	22×7-10	49/7
Rear Wheel	10×8.0 AT	22×10-10	49/7

- Since wheels and tyres are crucial to the vehicle operation, inspection for tyre pressure and profile depth is necessary.
- To ensure maximum security and longer life expectancy of the wheel, please periodically inspect the tyre pressure and profile depth. Insufficient tyre pressure can result in not only intensified wearing of the tyre but also instability during the course of operating the vehicle (such as hard turning). Excessive tyre pressure can also reduce the friction force between the tyre and ground, causing spinning or lose of control. Therefore, please ensure the tyre pressure strictly complies with figures shown in the chart above.
- Before operating the vehicle each time, please check if profile depth of the tyre is over worn, which might result in spinning, instability, lose of control and other potential security risk of the vehicle.

CHASSIS

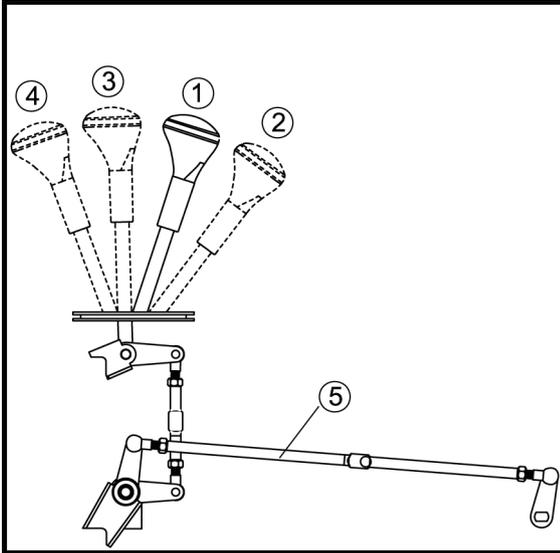
Shift Operating System



No.	Part Name	Qty	Remarks
	Removing the shift operating system		
1	Gear shifter assembly	1	
2	Handle cover	1	
3	Gearshift knob	1	
4	Gearshift rod	1	
5	Hexagon flange bolt M6×16	1	
6	Gearshift limiting pin	1	
7	Cotter pin 2×30	1	
8	Gearshift boot	1	
9	Gear shift rod I	2	
10	Gearshift tie assy I	1	

CHASSIS

Reverse mechanism parts



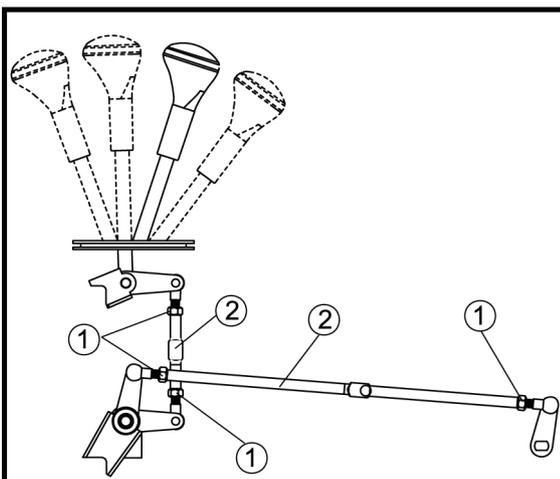
ADJUSTING REVERSE MECHANISM PARTS

- ① Neutral
- ② Reverse
- ③ High
- ④ Low
- ⑤ Select lever shift rod

NOTE:

Before shifting, you must stop the vehicle and take your foot off the accelerator pedal. Otherwise, the transmission may be damaged.

1. Adjust:
 - Select lever shift rod
 - a. Make sure the select lever is in NEUTRAL.
 - b. Loosen both in nuts ①.
 - c. Adjust the shift rod length for smooth and correct shifting ②.
 - d. Tighten the nuts ①.



Nut
23 Nm (2.3 m · kg, 17 ft · lb)

Reverse mechanism parts

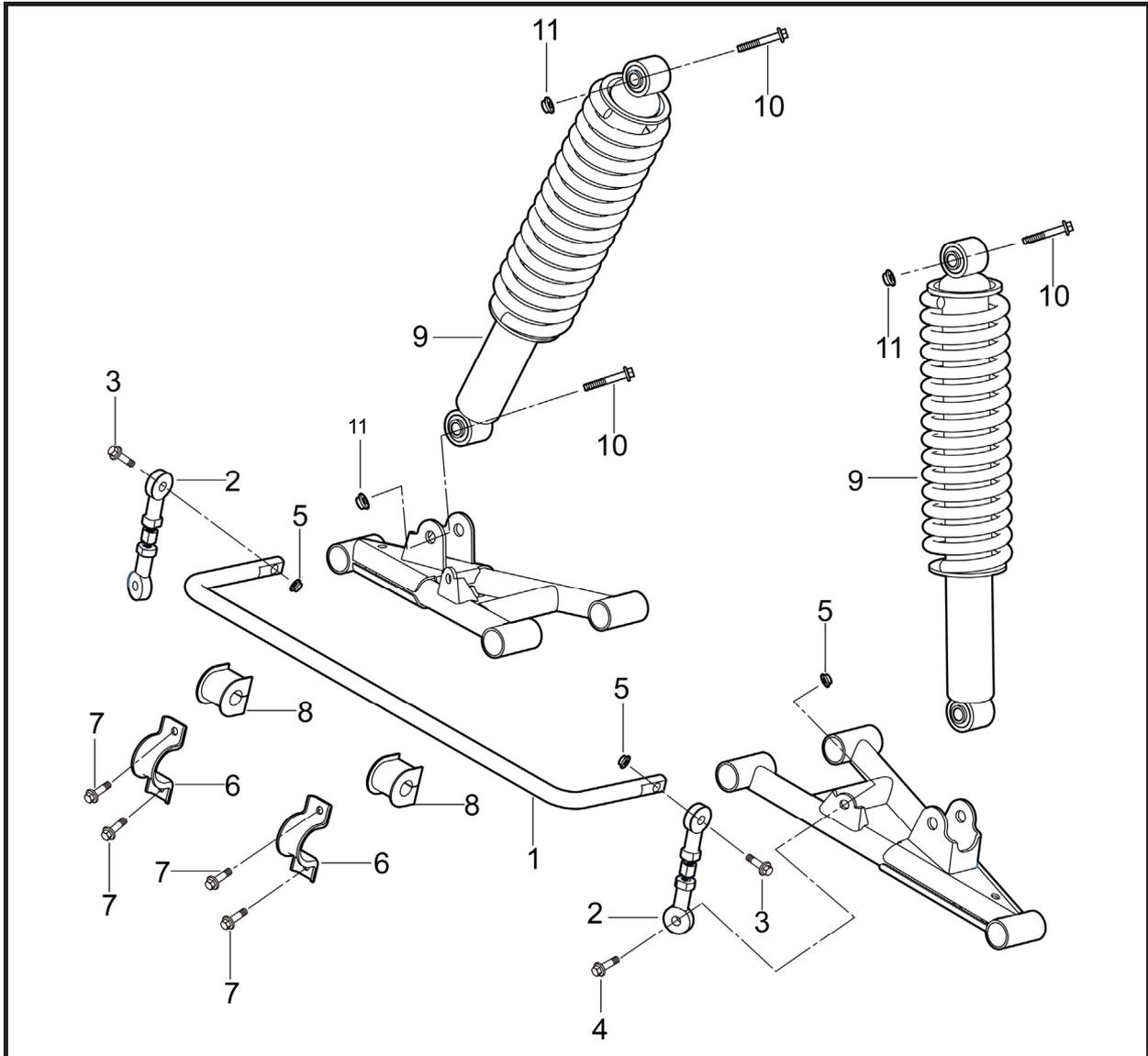
CHECKING AND SERVICE OF REVERSE MECHANISM

1. Check the mobility of gear shift handle. If it is not working properly, remove the gear shift Mechanism to check if the fork , ball and spring is stuck., in which case replace the defective component and try again. The last way is to turn to the professional repairman.
2. If there is lack in the gear shift mechanism , adjust the nut of the fork to correct position and strengthen gear shift mechanism .
3. Remove the gear shift mechanism and check whether the linking rod is cracked; If so, it should be changed.
4. Check whether the bouncing spring of gear shift mechanism is intense enough.
5. Check whether the gear is engaged correctly and whether there are trip stop or lack. If these situation exists, call for the maintenance staff to test and repair it.
6. If the gear can not be engaged, we can test it from the following aspects:
 - whether the clutch can completely declutch;
 - whether the gearshift is greased reliable (whether the oil pipe of gear shift mechanism is blocked);
 - whether gear shift mechanism jams; If these situation happens, maintenance staff would come to test and repair it.

CHASSIS

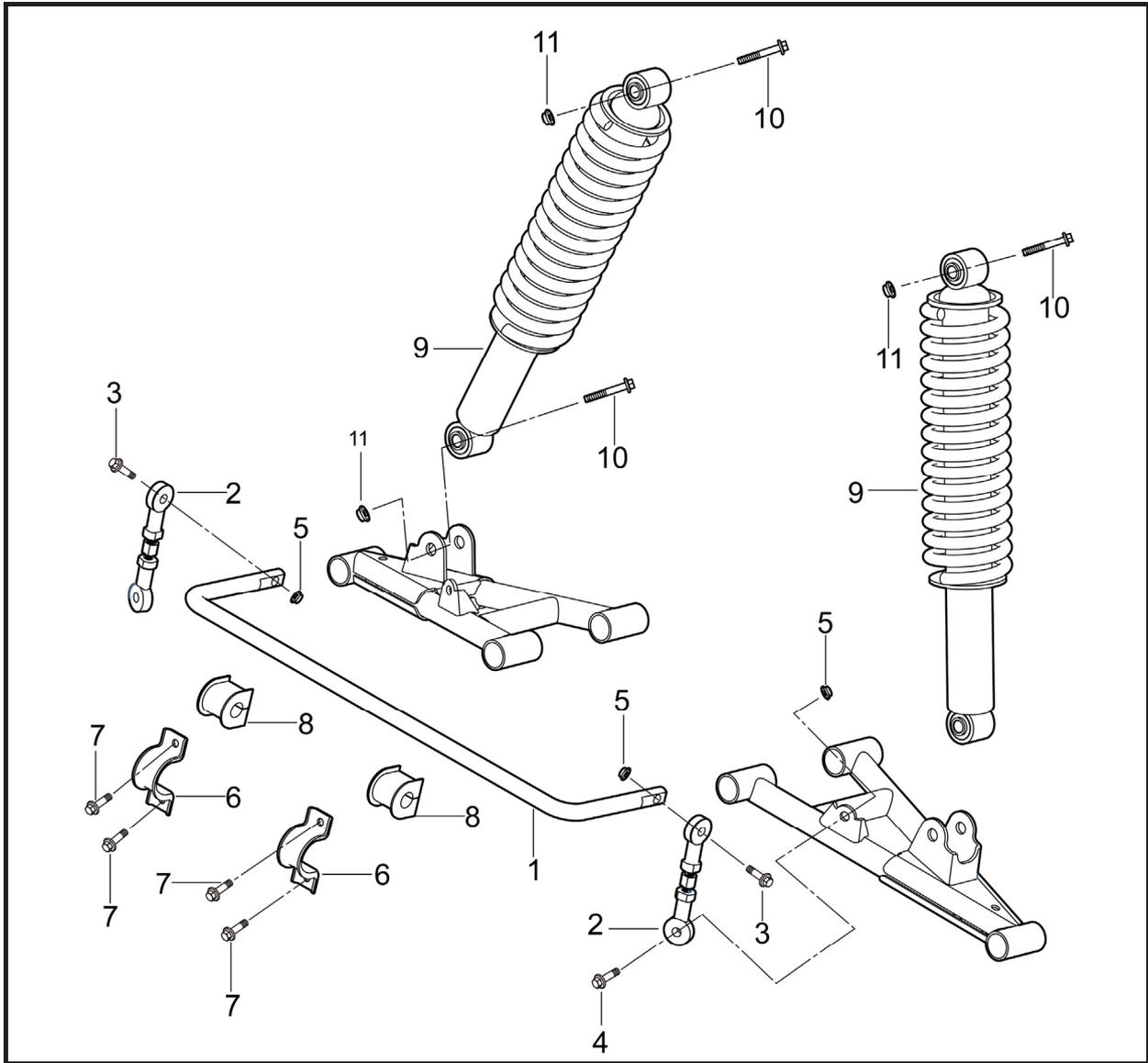
SUSPENSION

Front Swing Arm



No.	Part Name	Qty	Remarks
	Removing the front swing arm		
1	Balance lever	1	
2	Tie rod assy., balance lever	2	
3	Hexagon flange bolt M8×1.25×35	2	
4	Hexagon flange bolt M8×1.25×30	2	
5	Hexagon flange nut M8×1.25	4	
6	Press board, anti-roller lever	2	
7	Hexagon flange bolt M8×1.25×20	4	
8	U-shaped rubber sleeve	2	

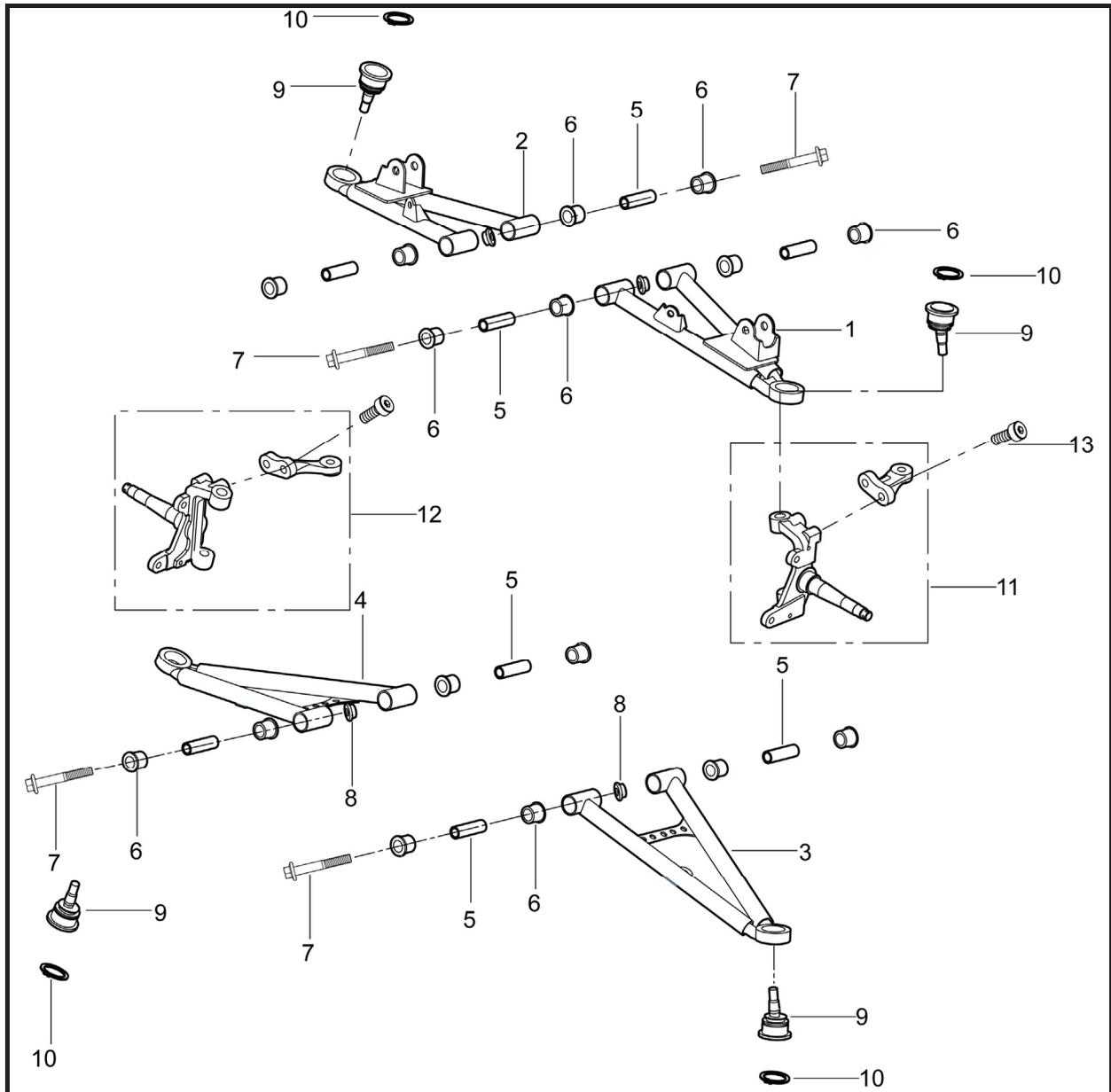
CHASSIS



No.	Part Name	Qty	Remarks
9	Front shock absorber	2	
10	Bolt M10×1.25×50	4	
11	Hexagon flange locked nut M10×1.25	4	

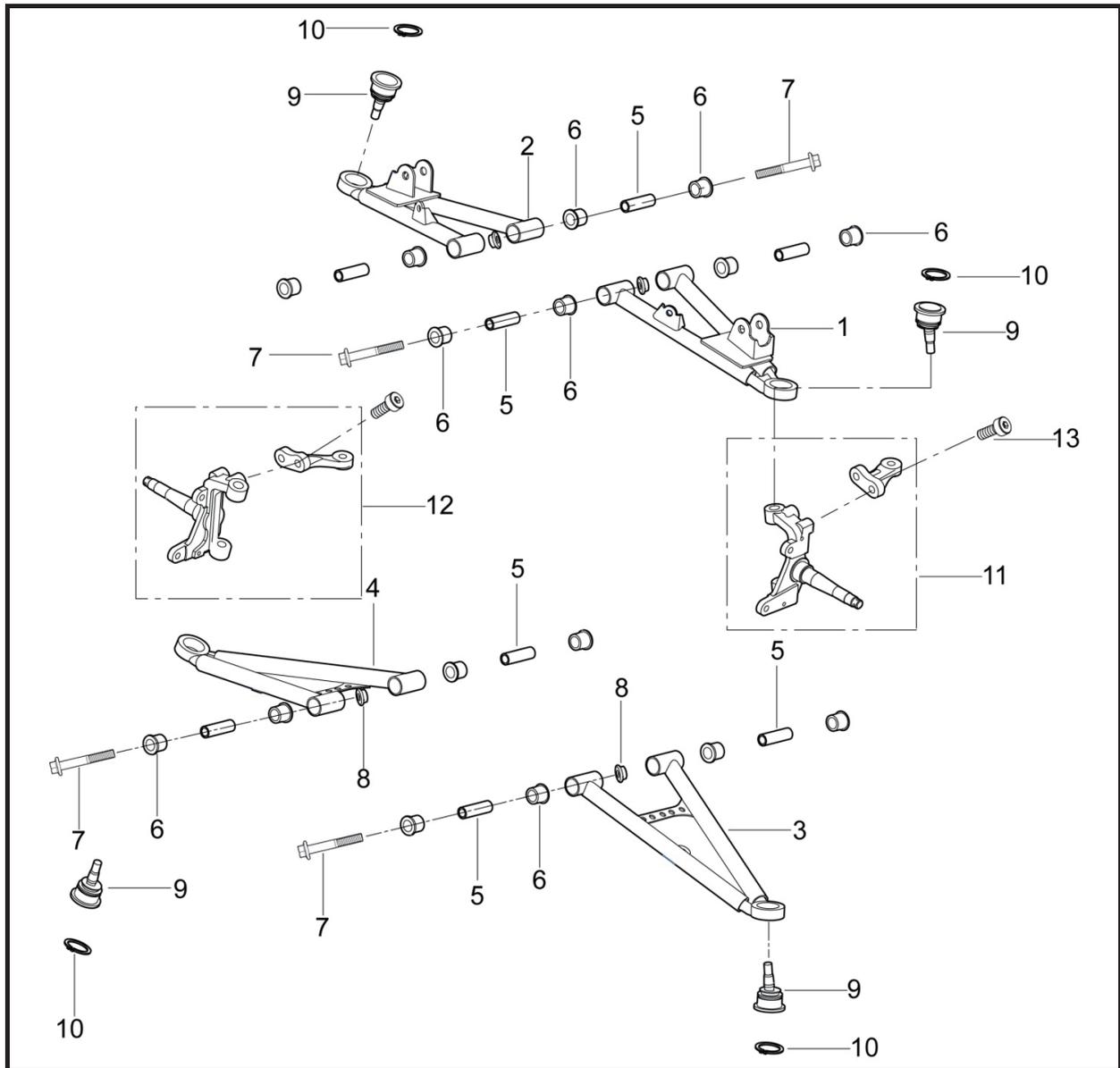
CHASSIS

Front Suspension



No.	Part Name	Qty	Remarks
	Removing the front suspension		
1	Front left upper swing arm	1	
2	Front right upper swing arm	1	
3	Front left lower swing arm	1	
4	Front right lower swing arm	1	
5	Front swing arm bushing	8	
6	Middle rubber tube, swing arm	16	
7	Hexagon flange bolt M10×1.25×70	8	
8	Hexagon flange locked nut M10×1.25	8	

CHASSIS



No.	Part Name	Qty	Remarks
9	Suspension of universal joint A	4	
10	Elasticity block ring d=30	4	
11	Front left steering knuckle assy.	1	
12	Front right steering knuckle assy.	1	
13	Socket hexagon screw M10×1.25×20	4	

CHASSIS

Front Suspension and arm

DISASSEMBLING, SERVICE AND ASSEMBLY THE SUPPORTING ROCKER PARTS

1. Disassembling and Service

In the suspension, there is easy to appear the problem with bushing, cotter pin and shock absorber.

- If the left and right rocker rocks fiercely, check the few aspect, whether the bushing of the rocker is crushed, the middle rubber separate is aging and chapped.

- check whether the cotter pin is credible, if it is not instead the same spec cotter pin.

- The problem with the shock absorber and maintain method, whether it can returns to the position under the pressure and the torsional spring is rupture. If it is rupture or nearly to rupture, instead the shock absorber. whether it leak oil, if so instead the same spec shock absorber. According to the different request, if there is a oil cup on the rocker, must check it whether complete and refuels.

2. Install:

Mount fore L/R damper, up-and-down rocker arm assembly onto the frame with flange bolt nuts, self-locking to ensure a torque of 40 ~ 45Nm.

CAUTION:

- **These components should be greased with butter before assembly.**

- **The surface of components can not be cracked.**

CHASSIS

Front Suspension and arm

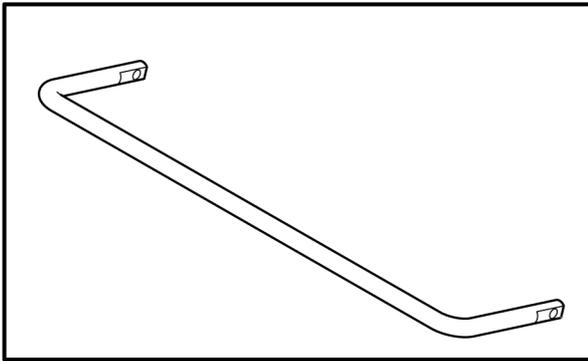
• Check whether these components are greased with butter and then tighten the up-and-down rocker arm assembly and L/R fore dampers and the components. Fix the L/R tension rods into hole by way of the trough of open-groove nut with cotter pin, and make these tension rods bisection on feet.

CHECKING THE BALANCE LEVER

1. Check:

- Balance lever

Bends/cracks/damage → Replace.



CHECKING THE FRONT ARMS

1. Check:

- front arms

Bends/damage → Replace.

2. Check:

- bushing

Wear/damage → Replace.

3. Check:

- Axle sleeve, liner

Damage/pitting → Replace the axle sleeve, liner

Free play → Replace the axle sleeve, liner

Turns roughly → Replace the axle sleeve, liner

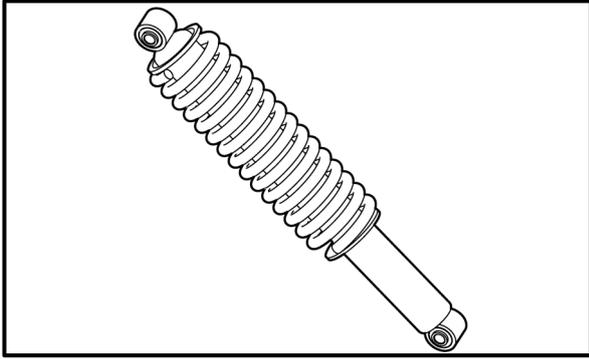
CHASSIS

CHECKING THE FRONT SHOCK ABSORBER

1. Check:

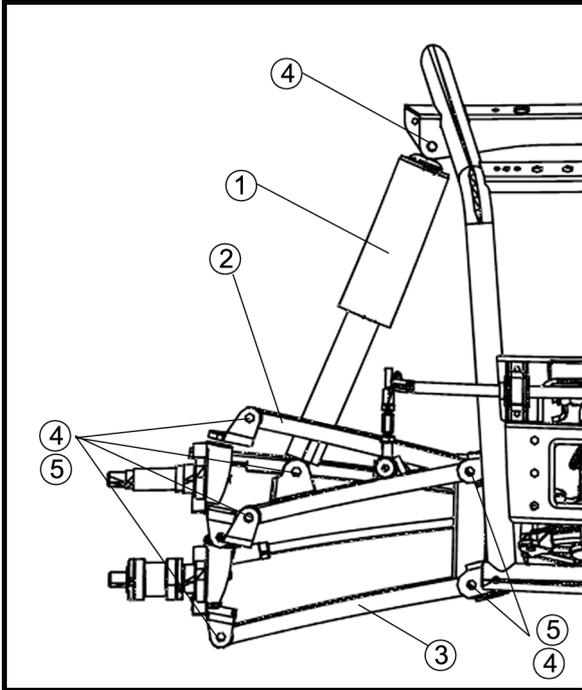
- shock absorber rod
Bends/damage → Replace the shock absorber assembly.
- shock absorber assembly
Oil leaks → Replace the shock absorber assembly.
- spring
Fatigue → Replace the shock absorber assembly.

Move the spring up and down.



CHASSIS

Front Suspension and arm



INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBER

1. Install:

- front arms
- front shock absorber

a. Install the front upper arm ② and front lower arm ③.

NOTE:

- Lubricate the bolts ④ with lithium-soap-based grease.
- Be sure to position the bolts ④ so that the bolt head faces inward.
- Temporarily tighten the nuts ⑤.

b. Install the front shock absorber ①.

Nut ⑤

45 Nm (4.5 m · kg, 32 ft · lb)

c. Install the front knuckle.

Nut ⑤

45 Nm (4.5 m · kg, 32 ft · lb)

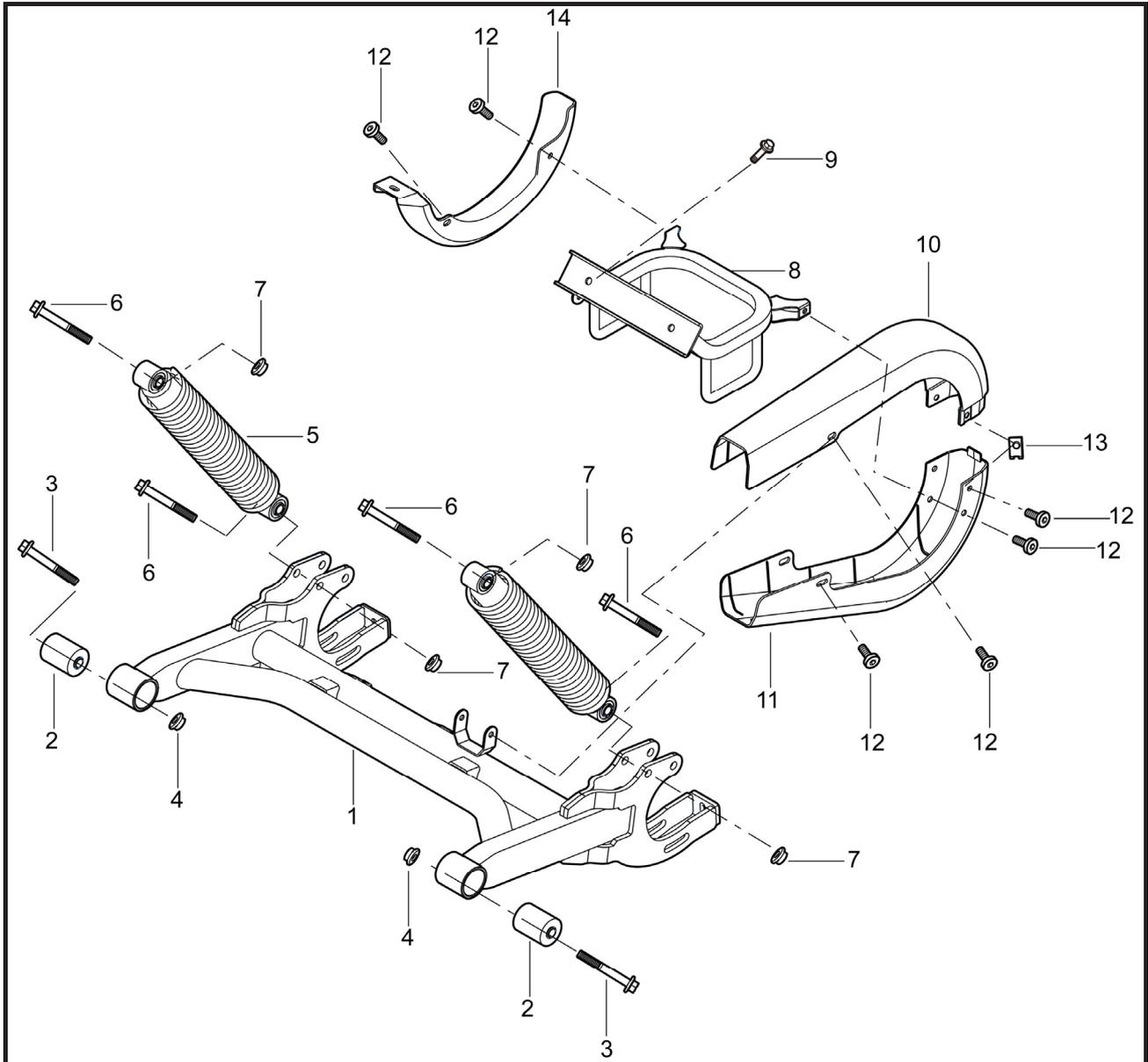
d. Tighten the nuts ⑤.

Nut ⑤

45 Nm (4.5 m · kg, 32 ft · lb)

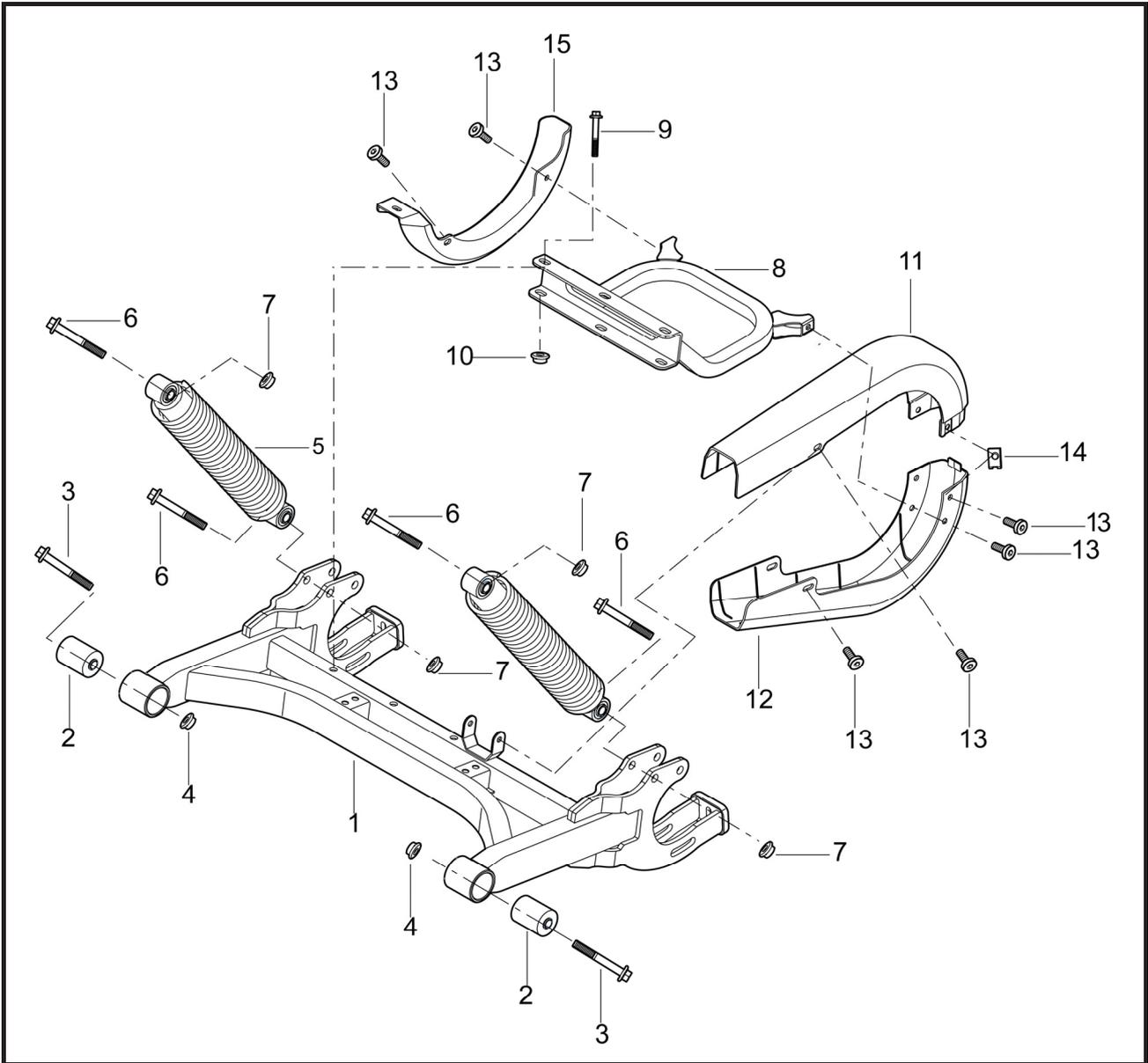
CHASSIS

Rear Swing Arm Assy.



No.	Part Name	Qty	Remarks
	Removing the rear swing arm assy.		
1	Rear suspension assy	1	
2	Rear suspension bushing	2	
3	Hexagon flange bolt M12×1.25×75	2	
4	Hexagon flange self-lock nuts M12×1.25	2	
5	Rear shock absorber	2	
6	Hexagon flange bolt M10×1.25×60	4	
7	Hexagon flange self-lock nuts M10×1.25	4	
8	Sprocket cover bracket welded assy	1	
9	Hexagon flange bolt M8×1.25×20	3	
10	Chain protecting bush I	3	

CHASSIS



No.	Part Name	Qty	Remarks
11	Chain protecting bush II	1	
12	Inner six angle screw	1	
13	Screw thread clip M6×2	9	
14	Parking disc cover	2	

CHASSIS

CHECKING AND SERVICE OF REAR SUSPENSION

1. It is similar to the front suspension ,Check if there exists any distortion or crack on the install axis of the shock absorber in which case it must be replaced.
2. Inspect the rocker bushing and the middle rubber separate is integrant.(According to the front Suspension)
3. The cotter pin on the head of the install axis which in the rear shock absorber whether is credible.

NOTE: _____

After disassemble the rear shock absorber, check if there exists any distortion or crack on the frame connection hole and the rear shock absorber, if so, inform the special serviceman to inspect and service first or install the rear shock absorber on the frame after instead.(Attention, the bolts must be the special self-lock nut, the fastening torque must be 45-55Nm)

CHASSIS

Rear swing arm assy.

CHECKING Rear Swing arm

1. Check:

- rear swing arm assy.
Damage/pitting → Replace

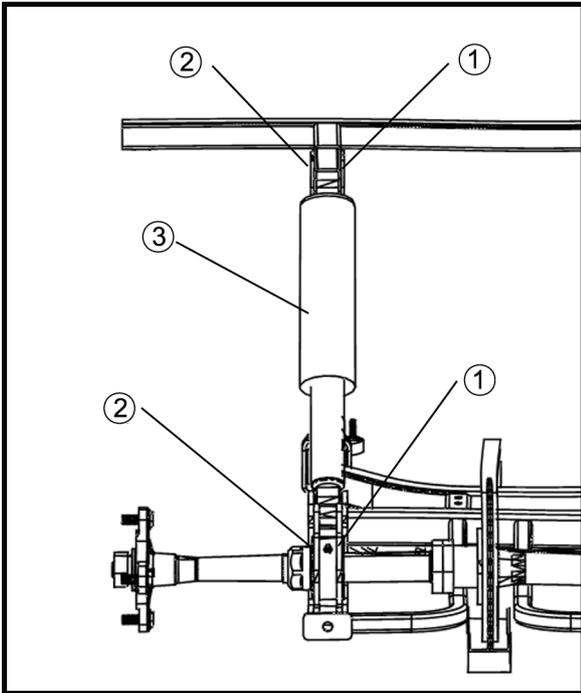
2. Check:

- rear shock absorber parts
Bends/damage → Replace.

3. Check:

- Rear swing arm bushing
Wear/damage → Replace.

CHASSIS



INSTALLING THE REAR SWING ARM ASSY.

1. Install:

- Rear swing arm
- Rear shock absorber parts

a. All components installed on the rear axle.

NOTE:

- Lubricate the bolts ① with lithium-soap-based grease.
- Be sure to position the bolts ① so that the bolt head faces outward.
- Temporarily tighten the nuts ②.

b. Install the rear shock absorber ③.

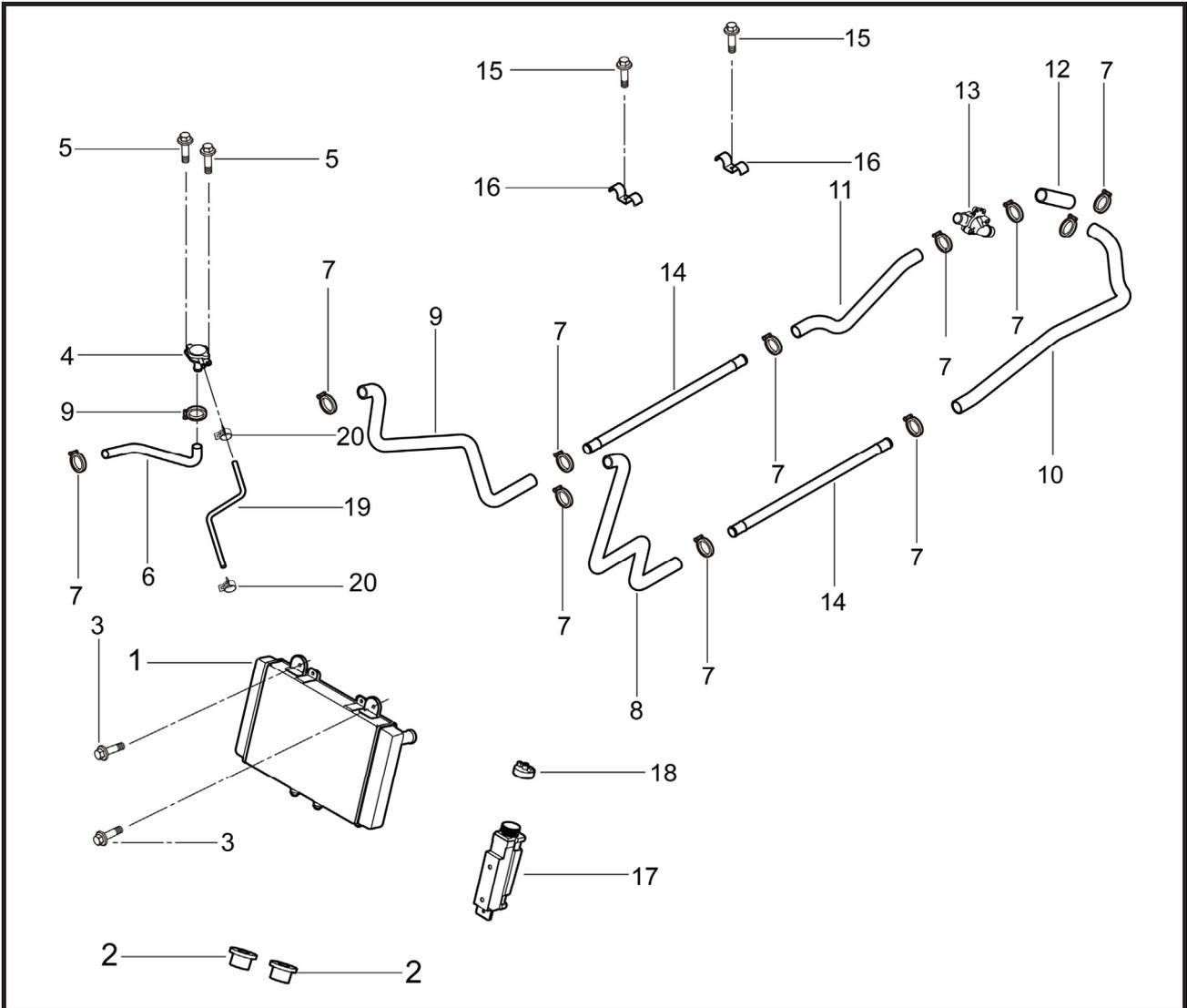
Nut ②

45 Nm (4.5 m · kg, 32 ft · lb)

CHASSIS

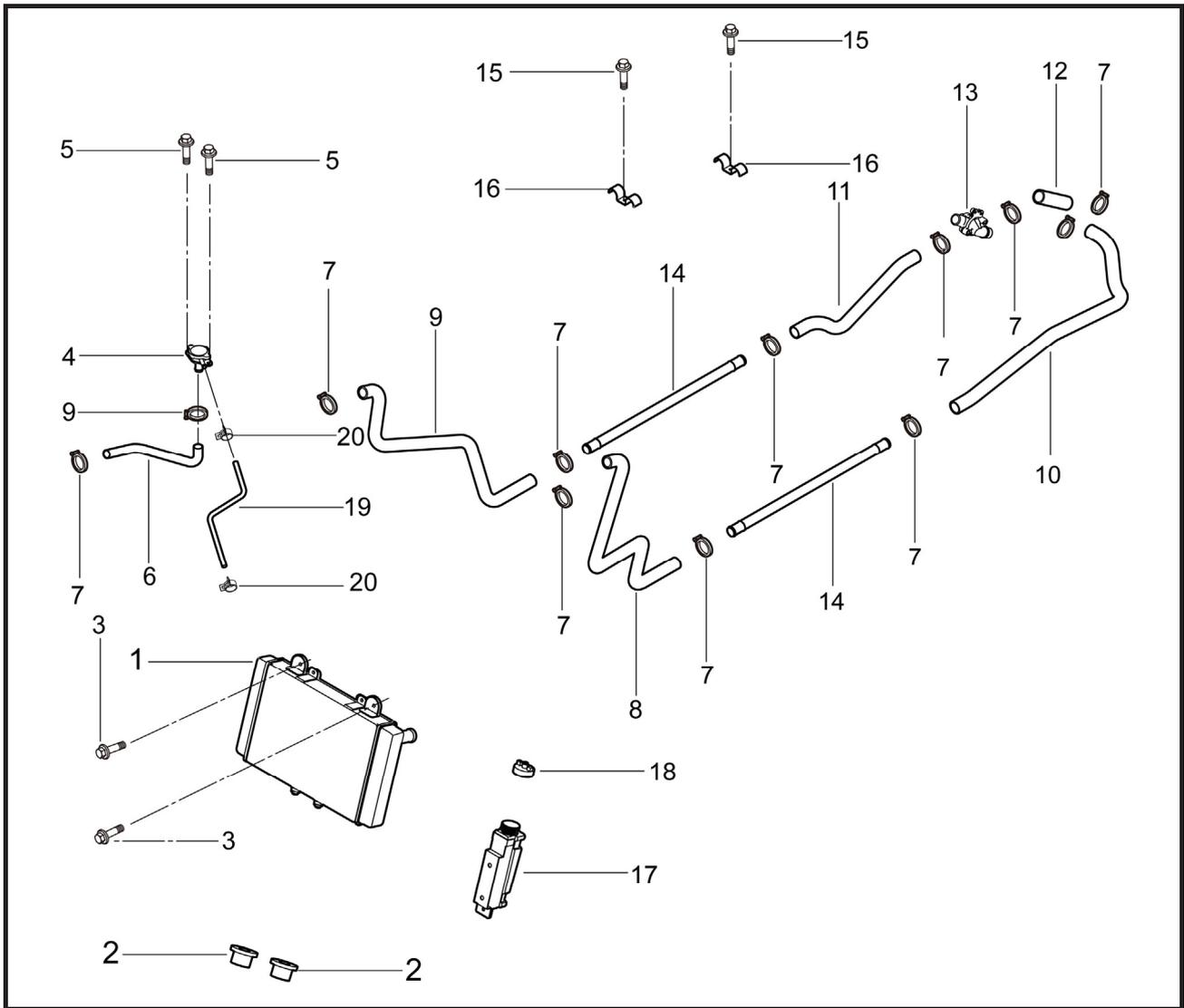
COOLING SYSTEM

Water Radiator



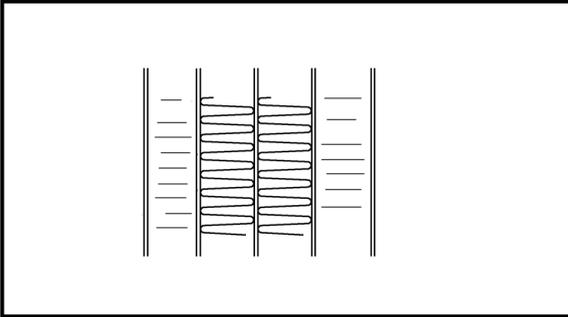
No.	Part Name	Qty	Remarks
	Removing the radiator		
1	Water tank	1	
2	Rubber cushion,water tank	2	
3	Hexagon flange self-locked bolt M6×20	2	
4	Water inlet assy	1	
5	Hexagon flange bolt M6×16	2	
6	Water pipe E	1	
7	Screw clip Φ20×32	12	
8	Front left water pipe	1	
9	Front right water pipe	1	
10	Rear left water pipe	1	
11	Rear right water pipe	1	

CHASSIS



No.	Part Name	Qty	Remarks
12	Rear water pipe ii	1	
13	Attemperator	1	
14	Metal water pipe	2	
15	Hexagon flange bolt M6 \times 16	2	
16	Water pipe clip	2	
17	Secondary water tank	1	
18	Secondary water tank cover	1	
19	Rubber pipe	1	
20	Clamp $\Phi 9$	2	

CHASSIS



CHECKING THE RADIATOR

1. Check:

- radiator fins

Obstruction → Clean.

Apply compressed air to the rear of the radiator

Damage → Repair or replace.

NOTE

Straighten any flattened fins with a thin, flat-head screwdriver.

2. Check:

- all rubber hose

Cracks/damage → Replace.

3. Check:

- Bolt clip

the tightness of Bolt clip. If loosen, please have the hoop tightened immediately.

4. Check:

- radiator fan

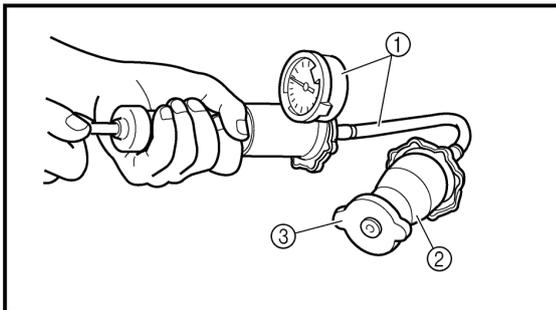
Damage → Replace.

Malfunction → Check and repair.

5. Measure:

- radiator cap opening pressure

Below the specified pressure → Replace the radiator cap.



Radiator cap opening pressure

107.9 ~ 137.3 KPa

(1.079 ~ 1.373 kg/cm², 15.35 ~ 19.53 psi)

a. Install the radiator cap tester ① and adapter ② onto the radiator cap ③.

b. Apply the specified pressure for ten seconds and make sure that there is no drop in pressure.

CHASSIS

INSTALLING THE RADIATOR

1. Fill:

- cooling system

Start engine when pour full the refrigerating fluid, loose the exhaust nut on the pipe, the water level will get lower at this time, Supply the refrigerating fluid until the water level stop to change, then screw the exhaust nut, cover the water tank lid.

The water tank inspection is finished. .

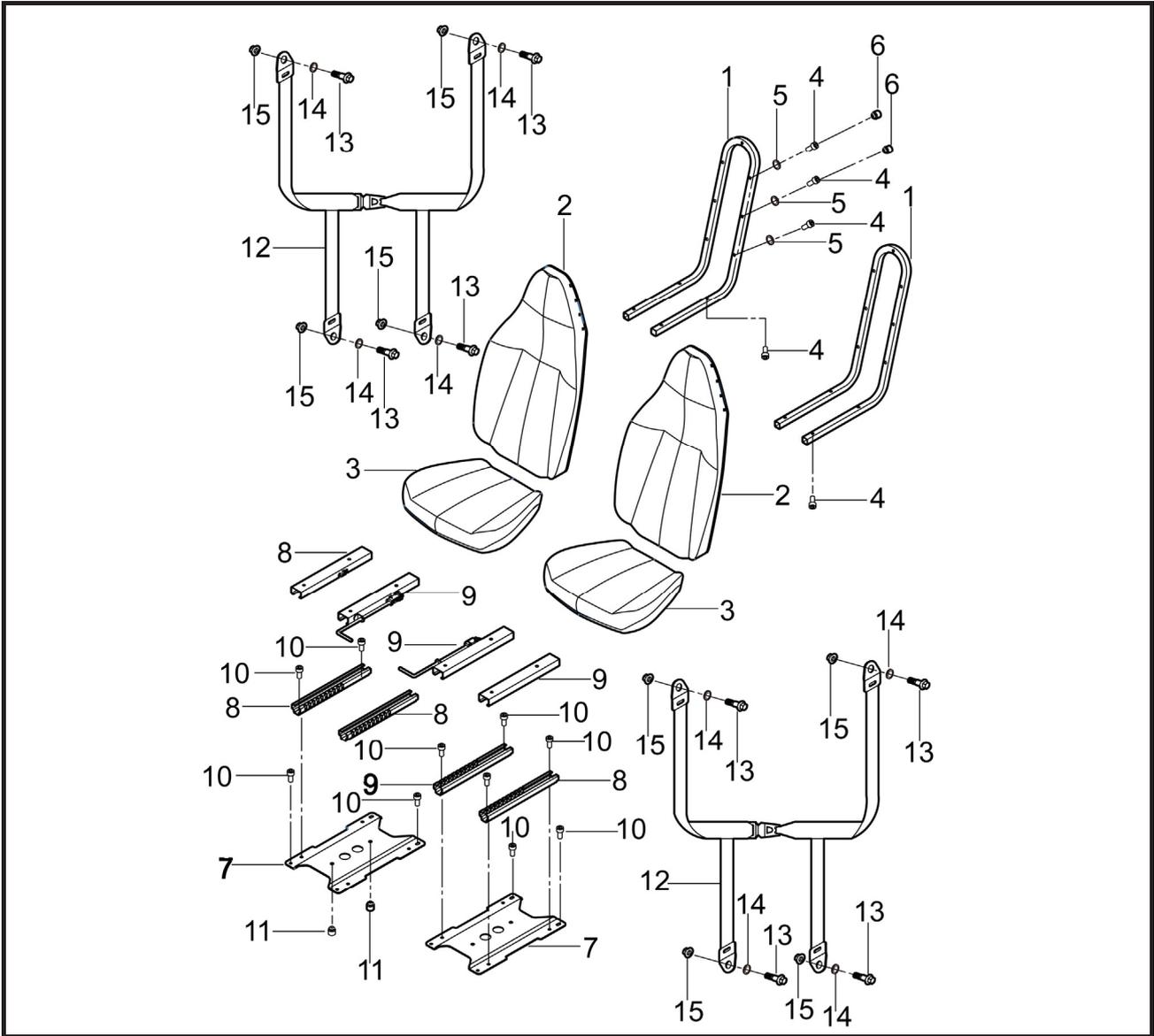
2. Check:

- cooling system

Leaks → Repair or replace any faulty part.

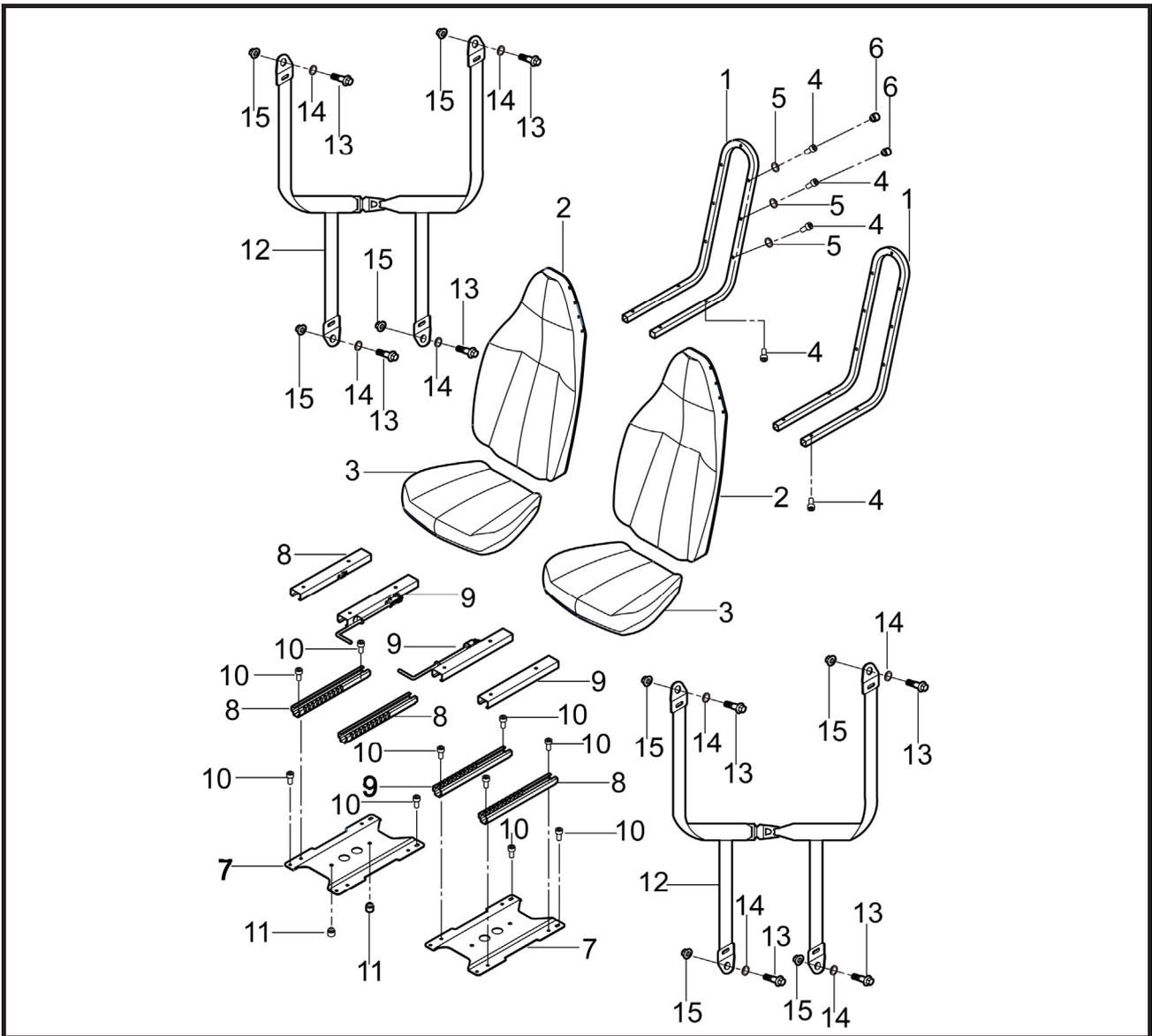
CHASSIS

SEAT



No.	Part Name	Qty	Remarks
	Removing the seat		
1	Seat connection assy.	2	
2	Back rest	2	
3	Seat cushion	2	
4	Hexagon bolt M8x25	22	
5	Washer $\Phi 8 \times \Phi 16 \times 1.6$	14	
6	Rubber plug $\Phi 19 \times \Phi 25 \times 10$	14	
7	Seat mounting board	2	
8	Slide rail (R)	2	
9	Slide rail (L)	2	
10	Hexagon socket head bolt M8x20	16	
11	Rubber thick gasket $\Phi 24 \times 15$	2	

CHASSIS



No.	Part Name	Qty	Remarks
12	Seat belt assy.	2	
13	Bolt M10×1.25×20-Φ14×5	8	
14	Gasket Φ10.5×Φ19×5	8	
15	Hexagon flange locked nut M10×1.25	8	

CHASSIS

DISASSEMBLING THE SEAT

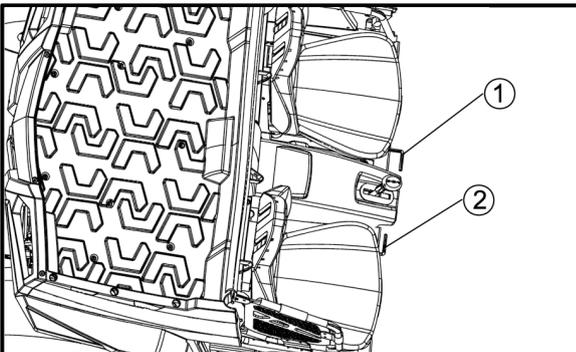
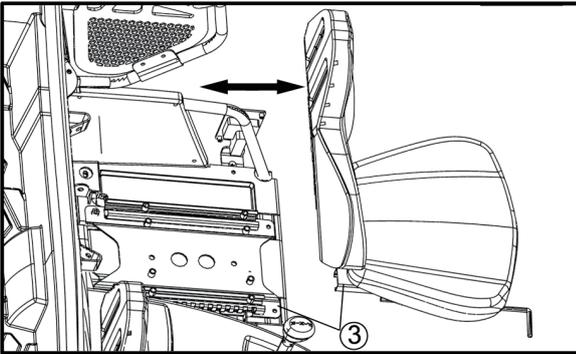
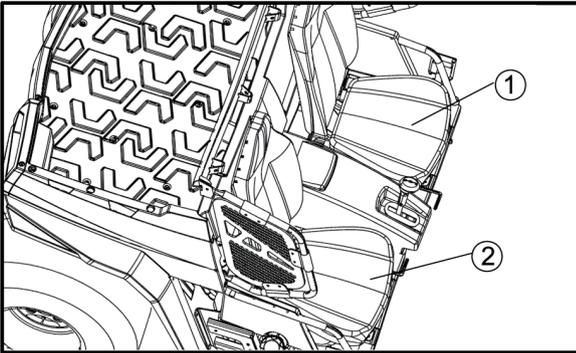
Remove:

- Driver seat ①
- Passenger seat ②
- Slide rail ③

To remove the seat, Remove Slide rail ③ forward (or backward), After reaching the correct position, Installation is the reverse of removal.

CAUTION:

- These components should be greased with butter before assembly.
- The surface of components can not be cracked.



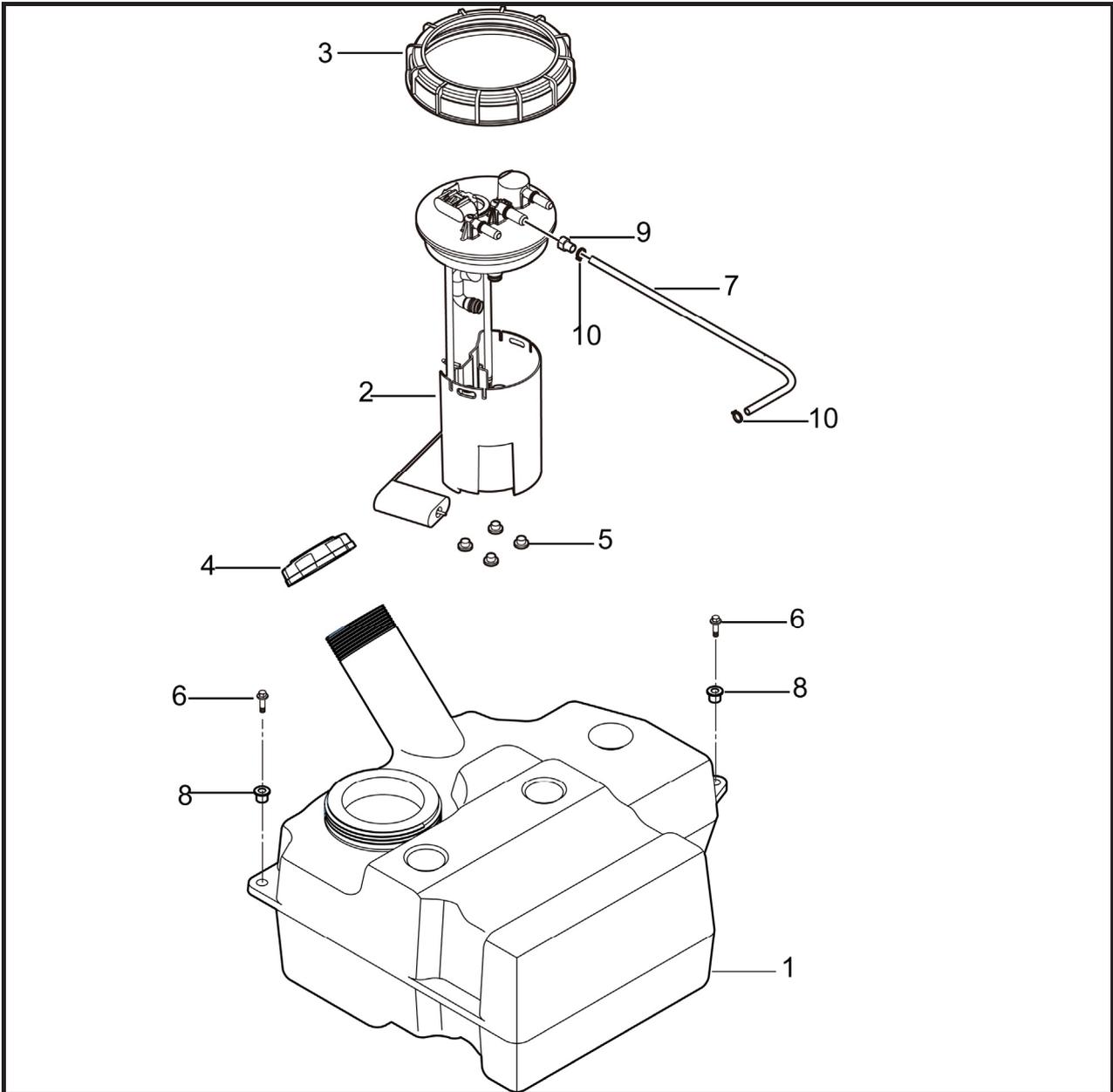
Moving Seat Forward And Backward

- Driver seat handle ①
- Passenger seat handle ②

The seat can be moved forward and backward to fit the height of different drivers. Pull up the handle, then you can move the seat forward and backward.

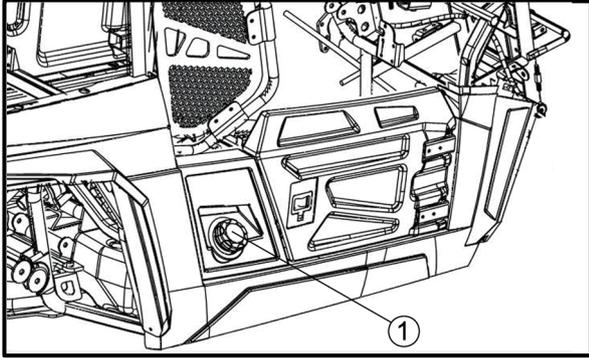
CHASSIS

FUEL TANK



No.	Part Name	Qty	Remarks
	Removing the fuel tank		
1	Fuel tank	1	
2	Fuel pump	1	
3	Cover, fuel pump(EFI engine)	1	
4	Fuel Tank cap	1	
5	Rubber cushion VIII	4	
6	Hexagon flange self-locked bolt M6×20	2	
7	Fuel pipe L=250 Φ14×Φ17×250	1	
8	Collar bushing Φ7×Φ9.5×Φ20×7	3	
9	Plug for fuel outlet(EFI Engine)	1	
10	Clamp	2	

CHASSIS



- Fuel tank cap

Remove the fuel tank cap by turning it counterclockwise.

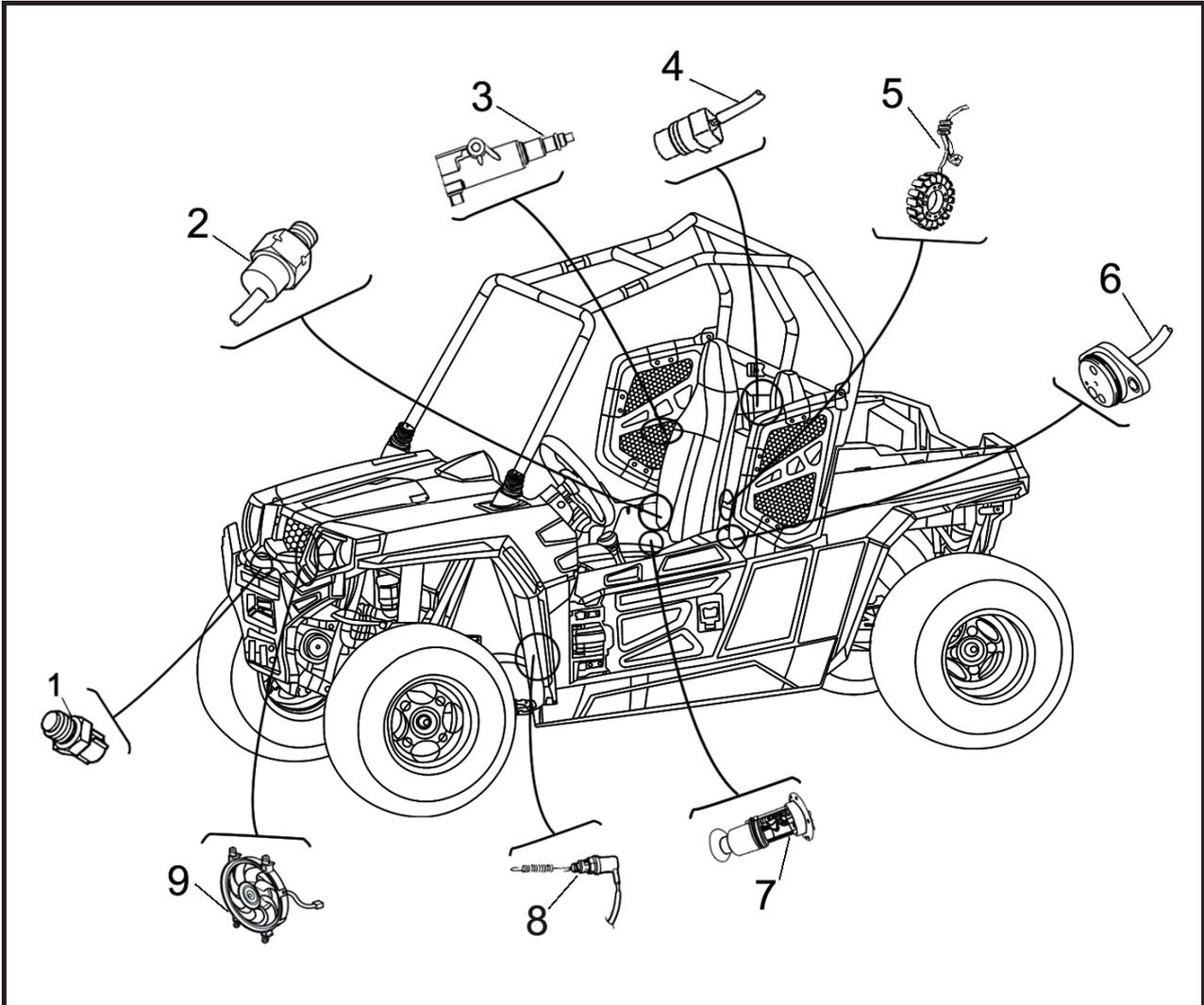
ELECTRICAL COMPONENTS

ELECTRICAL SYSTEM MALFUNCTION INSPECTION

S/N	Phenomenon	Measure
1	Abnormal lights	1、 Check whether switches normal.
		2、 Check whether cables damaged.
		3、 Check whether lights damaged.
2	Fail to electric start	1、 Check whether battery undercharge.
		2、 Check whether starting motor damaged.
		3、 Check whether EFI damaged.
		4、 Check whether ignition coil normal.
		5、 Check whether spark plug fouling or ablative.
		6、 Check whether crankshaft speedmeter magneto ignition signal normal.
		7、 Check whether ECU plugged or damaged.
		8、 Check whether air filter plugged.
		9、 Check whether oil circuit smooth.
3	Abnormal speed indication between meter and mileage.	1、 Check whether speedmeter damaged.
		2、 Check whether meter damaged.
		3、 Check whether speedmeter surface polluted by iron scrap,
4	Neutral indicator of meter is not bright	1、 Check whether neutral switch damaged.
		2、 Check whether meter damaged.
		3、 Check whether cable damaged.
5	Reverse indicator of meter is not bright	1、 Check whether reverse switch damaged.
		2、 Check whether meter damaged.
		3、 Check whether cable damaged.
6	Other indicators of meter are not bright	1、 Check whether meter damaged
		2、 Check whether cable damaged.
		3、 Check whether sensor or switch damaged.
7	Ignition switch can not shut off	1、 .Check whether switch damaged.
		2、 Check whether cable damaged.
		3、 Check whether ECU damaged.

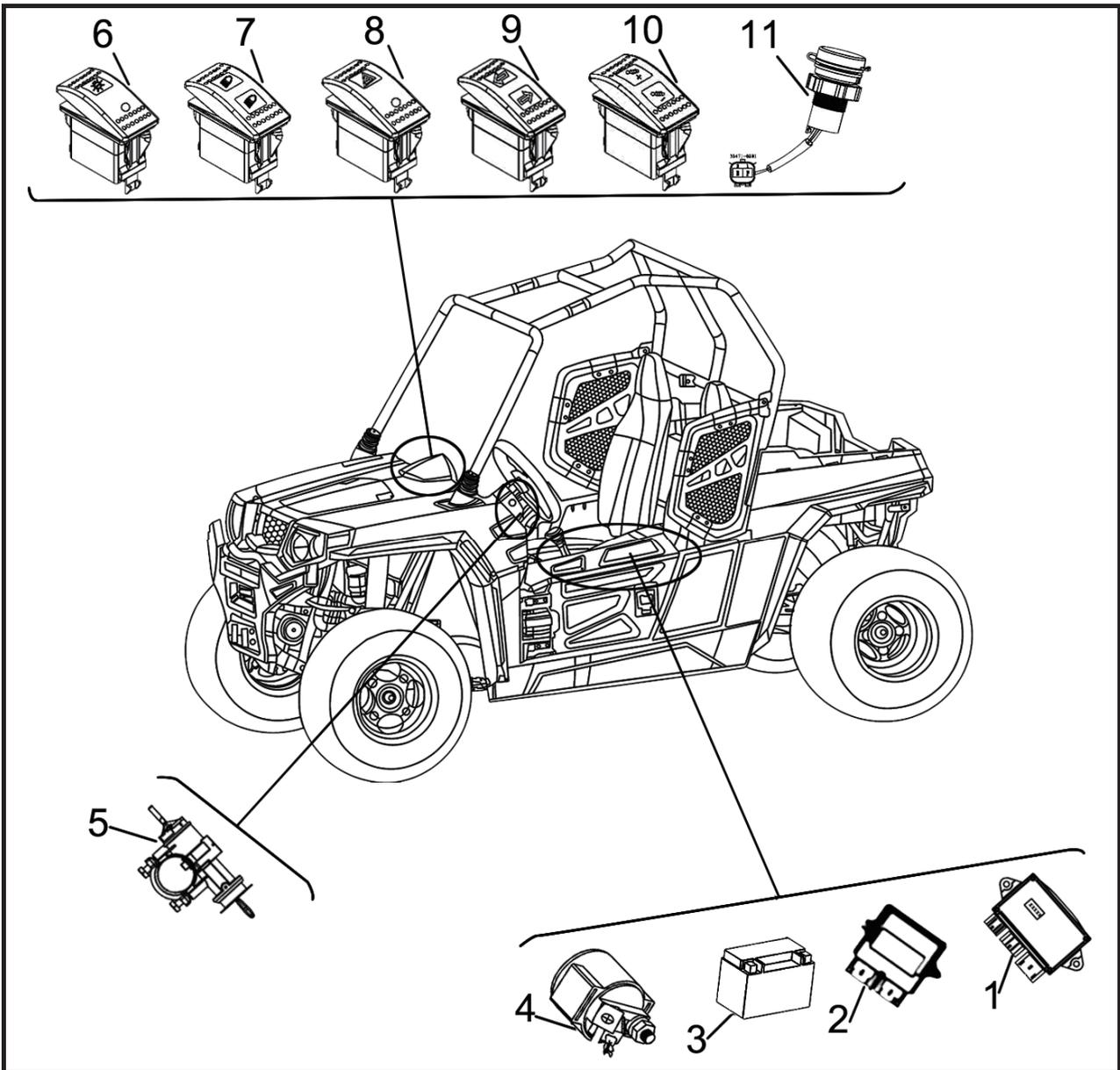
ELECTRICAL COMPONENTS

ELECTRICAL ELECTRICALCOMPONENTS



- | |
|-------------------------|
| 1. Thermo switch 1 |
| 2. Thermo switch2 |
| 3. Ignition coil |
| 4. Speed sensor |
| 5. stator assembly |
| 6. Gear position switch |
| 7. Fuel pump |
| 8. Brake light switch |
| 9. Radiator fan |

ELECTRICAL COMPONENTS



- | |
|--------------------------------|
| 1. Relay assy. |
| 2. ECU unit |
| 3. Battery |
| 4. Starter relay |
| 5. Main switch |
| 6. Light switch assy. |
| 7. Distance light switch |
| 8. Emergency lamp switch |
| 9. Turning light switch |
| 10. Windlass controller switch |
| 11. DC socket assy. |

ELECTRICAL COMPONENTS

CHECKING THE SWITCH

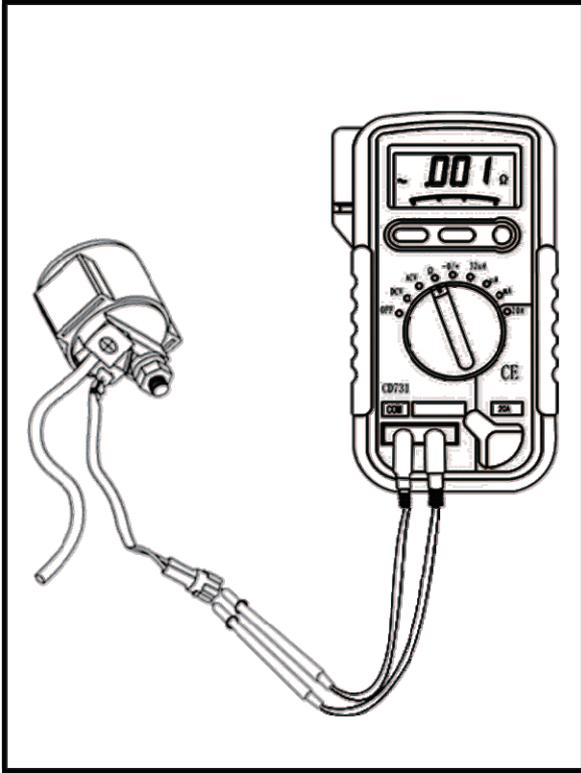
CHECKING THE SWITCH

Use multimeter to check the terminals for continuity. If the continuity is faulty at any point, replace the switch.

NOTE:

- When the power supply is opened, should the multimeter gear to 200 Ω , digital watch LCD display.

A about $4.4 \pm 0.3 \Omega$ in normal operations

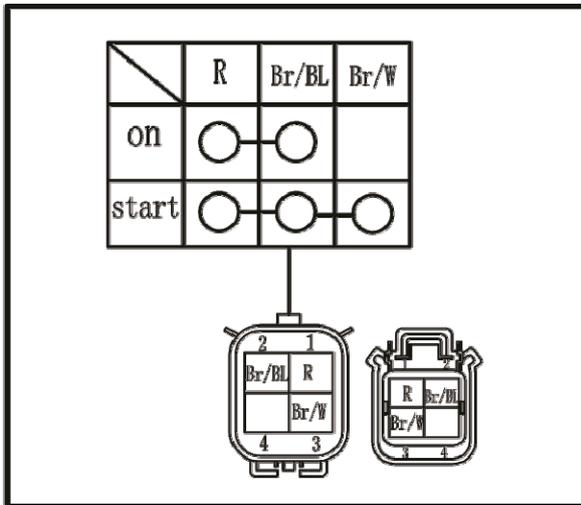


The terminal connections for switches (main switch, light switch, etc.) are shown in a chart similar to the one on the left. This chart shows the switch positions in the column and the switch lead colors in the top row.

For each switch position, “○—○” indicates the terminals with continuity.

The example chart shows that:

① There is continuity between the “Red and Brown/Blue” leads when the switch is set to “ON”.

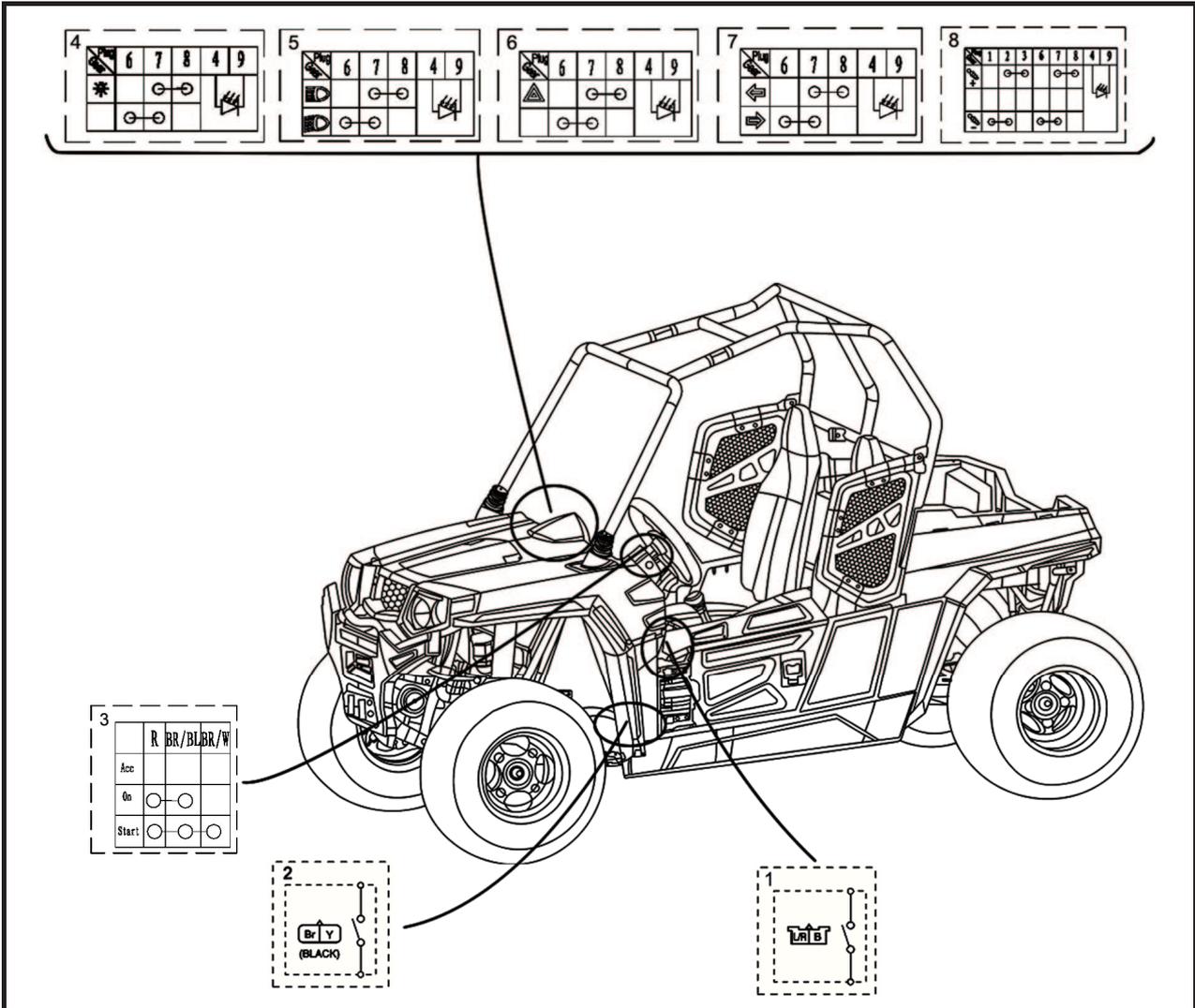


ELECTRICAL COMPONENTS

Checking the switch continuity

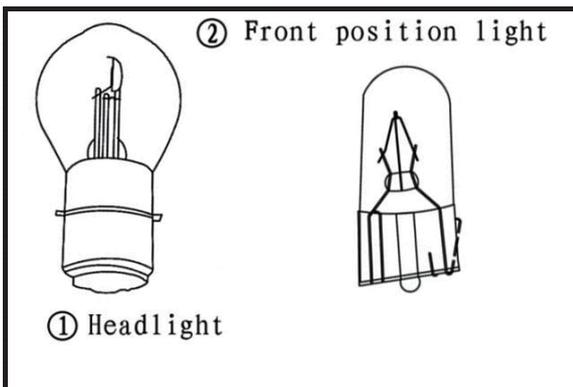
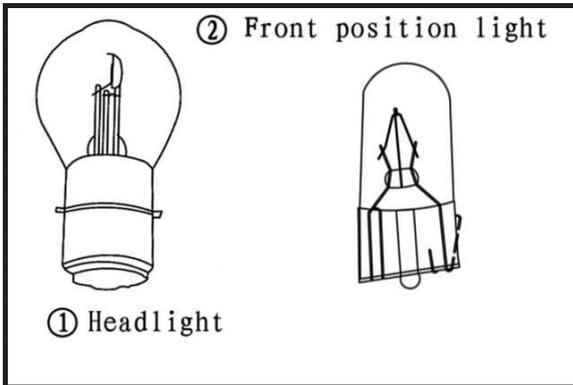
Refer to "CHECKING THE SWITCH" and check for continuity between lead terminals. Poor connection, no continuity → Correct or replace.

* The coupler locations are circled.



- | |
|-------------------------------|
| 1. Parking brake switch |
| 2. Brake light switch |
| 3. Main switch |
| 4. Light switch assy. |
| 5. Distance light switch |
| 6. Emergency lamp switch |
| 7. Turning light switch |
| 8. Windlass controller switch |

ELECTRICAL COMPONENTS



**IGNITION SYSTEM
CIRCUIT DIAGRAM (See 291 page)**

CHECKING THE BULBS AND BULB SOCKETS

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals

Damage/wear → Repair or replace the bulb, bulb socket or both.

Improperly connected → Properly connect.

Incorrect continuity reading → Repair or replace the bulb, bulb socket or both.

WARNING:

Since the bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

CAUTION:

- Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.
- Avoid touching the glass part of the bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

ELECTRICAL COMPONENTS

TROUBLESHOOTING

IF THE IGNITION SYSTEM FAILS TO OPERATE (NO SPARK OR INTERMITTENT SPARK):

Procedure

Check:

1. Battery
2. Spark plug
3. Ignition spark gap
4. Spark plug cap resistance
5. Ignition coil resistance
6. Main switch
7. Pickup coil resistance
8. Rotor rotation direction detection coil resistance
9. Wiring connection (the entire ignition system)

NOTE:

1. Cushion
2. Front frame
3. Front fender

Check and repair with following special tools.

1. Battery

- Check the battery condition. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

Open-circuit voltage

12.8 V or more at 20 °C (68 °F)



CORRECT

2. Spark plug

- Check the spark plug condition.
 - Check the spark plug type.
 - Check the spark plug gap.
- Refer to "CHECKING THE SPARK PLUG" in chapter 3.

INCORRECT



- Clean the battery terminals.
- Recharge or replace the battery.

ELECTRICAL COMPONENTS

3. Ignition spark gap

- Disconnect the spark plug cap from the spark plug.
- Connect the pulse ignition spark checker or ignition checker ① as shown.

② Spark plug cap

- Turn the main switch to "ON".
- Check the ignition spark gap ②.
- Crank the engine by pushing the starter switch, and increase the spark gap until a misfiring occurs.

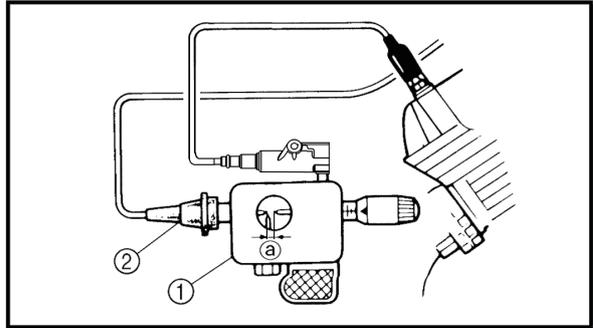
Minimum spark gap

6.0 mm (0.24 in)

OUT OF SPECIFICATION OR
NO SPARK

INCORRECT

Repair or replace the spark plug.



MEETS SPECIFICATION

The ignition system is not faulty.

4. Spark plug cap resistance

- Remove the spark plug cap.
- Connect the pocket tester ($\Omega \times 1k$) to the spark plug cap.
- Check that the spark plug cap has the specified resistance.

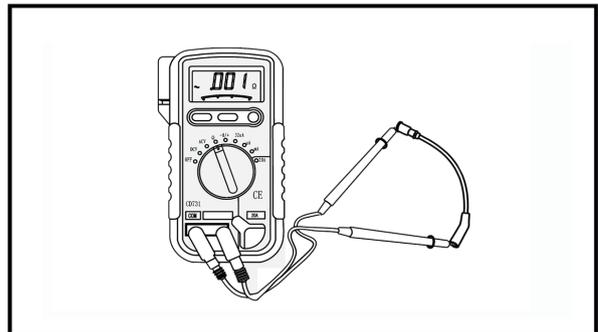
Spark plug cap resistance

10 k Ω at 20 °C (68 °F)

MEETS SPECIFICATION

OUT OF SPECIFICATION

Replace the spark plug cap.



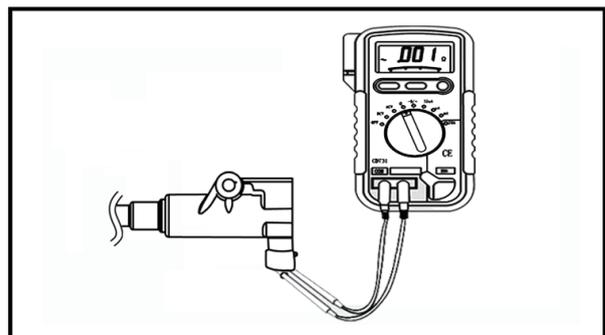
5. Ignition coil resistance

- Disconnect the ignition coil connector from the wire harness
- Connect the pocket tester ($\Omega \times 1$) to the ignition coil.

Tester (+) lead → Orange lead terminal

Tester (-) lead → Ignition coil base

- Check that the primary coil has the specified



ELECTRICAL COMPONENTS

. resistance

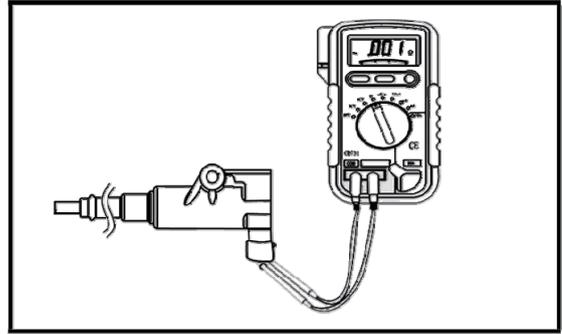
Primary coil resistance
0.18 ~ 0.28 Ω at 20 °C (68 °F)

- Connect the pocket tester ($\Omega \times 1k$) to the ignition coil.

Tester (+) lead \rightarrow Orange lead terminal
Tester (-) lead \rightarrow Spark plug lead

- Check that the secondary coil has the specified resistance.

Secondary coil resistance
6.32 ~ 9.48 k Ω at 20 °C (68 °F)



OUT OF SPECIFICATION

Replace the ignition coil.

BOTH MEET SPECIFICATION

6. Main switch

Refer to "CHECKING THE SWITCH"

CORRECT

INCORRECT

Replace the main switch.

7. Pickup coil resistance

- Disconnect the A.C. magneto coupler from the wire harness.
- Connect the pocket tester ($\Omega \times 100$) to the pickup coil terminal.

Tester (+) lead \rightarrow White/ Blue terminal ①

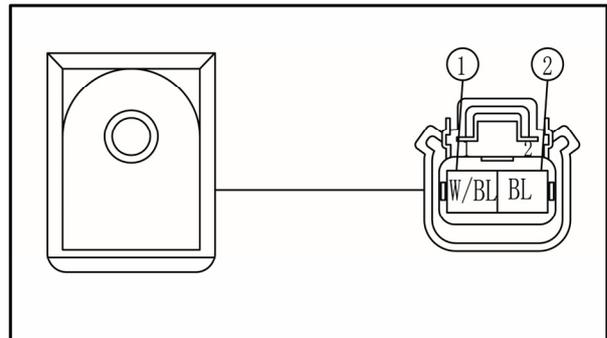
Tester (-) lead \rightarrow Green terminal ②

- Check the pickup coil for the specified resistance.

Pickup coil resistance

459 ~ 561 Ω at 20 °C (68 °F)

(White/Red – White/Green)



OUT OF SPECIFICATION

Replace the pickup coil/stator assembly.

MEETS SPECIFICATION

ELECTRICAL COMPONENTS

8. Rotor rotation direction detection coil resistance

- Disconnect the A.C. magneto coupler from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) to the rotor rotation direction detection coil terminal.

Tester (+) lead → Blue/White terminal ①

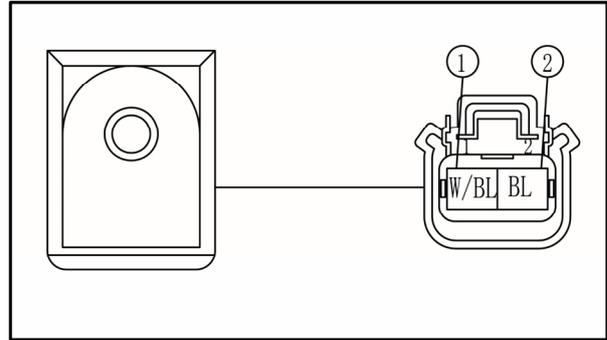
Tester (-) lead → Blue terminal ②

- Check the rotor rotation direction detection coil for the specified resistance.

Rotor rotation direction detection coil resistance

0.063 ~ 0.077 Ω at 20 °C (68 °F)

(Red – White/Blue)



OUT OF SPECIFICATION

Replace the pickup coil/stator assembly.

MEETS SPECIFICATION

9. Wiring connection

- Check the connections of the entire ignition system. Refer to "CIRCUIT DIAGRAM".

CORRECT

Replace the ECU unit

POOR CONNECTION

Properly connect the ignition system.

**ELECTRIC STARTING SYSTEM
CIRCUIT DIAGRA (See 292 page)**

ELECTRICAL COMPONENTS

TROUBLESHOOTING

IF THE STARTER MOTOR FAILS TO OPERATE:

Procedure

Check:

1. Battery
2. Starter motor
3. Starter relay
4. Main switch

5. Gear position switch
6. Brake light switch
7. Diode 1
8. Wiring connection (the entire starting system)

NOTE:

- Remove the following part(s) before troubleshooting:
 1. Console
 2. Front frame
 3. Front fender
- Use the following special tool(s) for troubleshooting.

1. Battery
 - Check the battery condition. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

Open-circuit voltage

12.8 V or more at 20 °C (68 °F)

CORRECT



INCORRECT



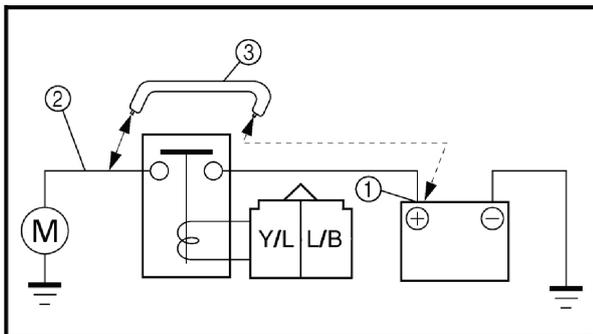
- Clean the battery terminals.
- Recharge or replace the battery.

2. Starter motor

- Connect the battery (+) terminal ① and starter motor cable ② using a jumper lead ③
- Check the operation of the starter motor.

WARNING:

- A wire that is used as a jumper lead must have the equivalent capacity or more as that of the battery lead, otherwise the jumper lead may burn.
- This check is likely to produce sparks, so be sure that no flammable gas or fluid is in the vicinity.



↓
TURNS

DO NOT TURN



- Repair or replace the starter motor.
- Small testers and battery and (12V) and start relay terminal connection
- Check continuity of the start relay

ELECTRICAL COMPONENTS

3. Starter relay

- Remove the starter relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and the battery (12 V) to the starter relay terminals.

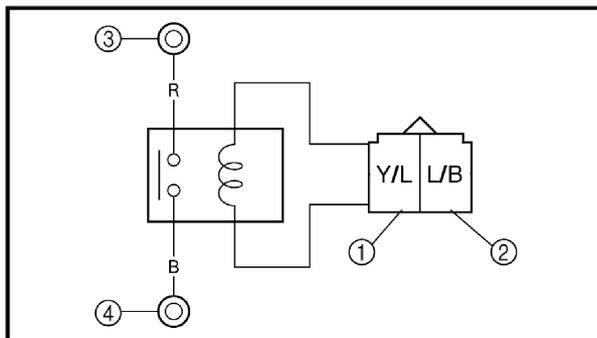
Battery (+) terminal → Yellow/Blue terminal ①

Battery (-) terminal → Blue/Black terminal ②

Tester (+) lead → Red terminal ③

Tester (-) lead → Black terminal ④

- Check the starter relay for continuity.



NO CONTINUITY

Replace the starter relay.

CONTINUITY

4. Main switch Refer to "CHECKING THE SWITCH".

INCORRECT

Replace the main switch.

CORRECT

5. Gear position switch Refer to "CHECKING THE SWITCH".

INCORRECT

Replace the gear position switch.

CORRECT

6. Brake light switch Refer to "CHECKING THE SWITCH".

INCORRECT

Removed from the coupling diodes
Small diode Tester connection terminals, As shown in the figure
Replace the brake light switch.

CORRECT

7. Diode 1

- Remove the diode from the coupler
- Connect the pocket tester ($\Omega \times 1$) to the diode terminals as shown.
- Check the diode for continuity as follows

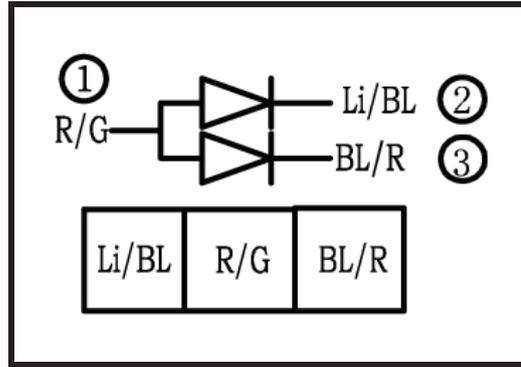
Check the diode continuity

ELECTRICAL COMPONENTS

NOTE:

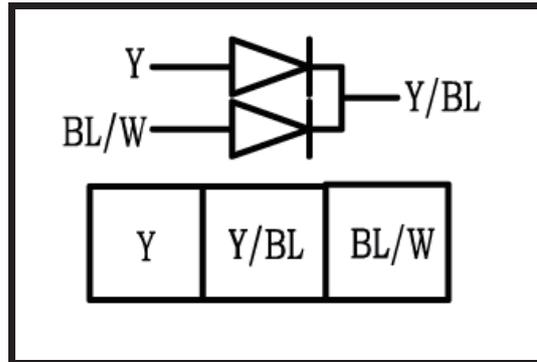
(→)When you switch the tester’s positive and negative probes, the readings in the left chart will be reversed.

(→)Connect multimeter positive to Red/Bule white terminal (1)
Connect multimeter negative to Yellow/Bule terminal (2)



NOTE:

(→)When you switch the tester’s positive and negative probes, the readings in the left chart will be reversed.



CORRECT

8. Wiring connection

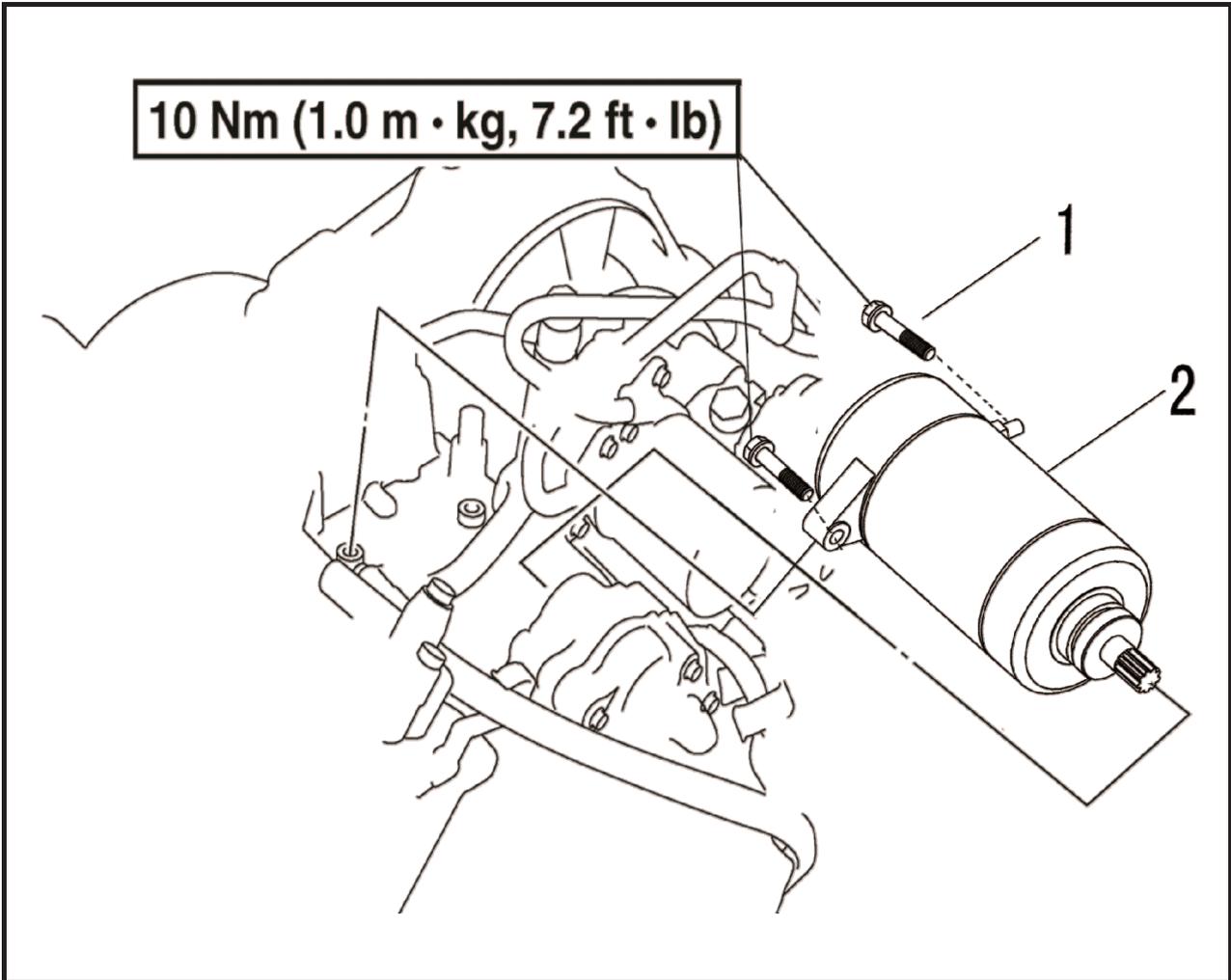
- Check the connections of the entire starting system. Refer to “CIRCUIT DIAGRAM”.

POOR CONNECTION

Properly connect the starting system.

ELECTRICAL COMPONENTS

STARTER MOTOR



No.	Part Name	Qty	Remarks
	Removing the starter motor		Remove the parts in the order listed
1	Flange bolt	1	
2	Starter motor assy.	1 / 1	

CHARGING SYSTEM

CIRCUIT DIAGRAM (See 293 page)

ELECTRICAL COMPONENTS

TROUBLESHOOTING

IF THE BATTERY IS NOT CHARGED:

1. Battery
2. Charging voltage
3. Charging coil resistance
4. Wiring connections(the entire charging system)

NOTE:

Remove some parts before maintenance

1. Cushion

Repair with following special toolings

1. Battery

- Check the battery condition. Refer to "CHECKING AND CHARGING THE BATTERY in chapter 3.

Open-circuit voltage

12.8 V or more at 20 °C (68 °F)



CORRECT

2. Charging voltage

- Connect the engine tachometer to the spark plug lead.
- Connect the pocket tester (DC 20 V) to the battery.

Tester (+) lead → Battery (+) terminal

Tester (-) lead → Battery (-) terminal

- Start the engine and accelerate to about 1,000 r/min.

Charging voltage 14 V at 1,450 r/min

NOTE:

Use a fully charged battery.



OUT OF SPECIFICATION

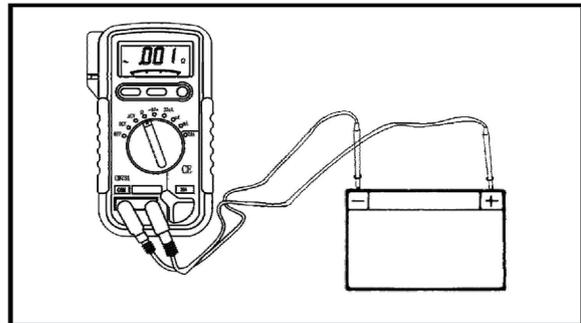
3. Charging coil resistance

- Disconnect the A.C. magneto coupler from the wire harness.

INCORRECT



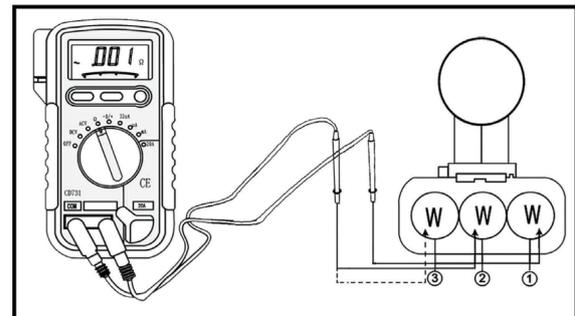
- Clean the battery terminals.
- Recharge or replace the battery.



MEETS SPECIFICATION



The charging circuit is not faulty.



ELECTRICAL COMPONENTS

- Connect the pocket tester ($\Omega \times 1$) to the charging coils.

Tester (+) lead → White terminal ①

Tester (-) lead → White terminal ②

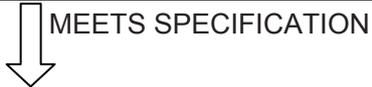
Tester (+) lead → White terminal ①

Tester (-) lead → White terminal ③

- Measure the charging coil resistance.

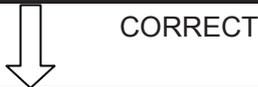
Charging coil resistance

0.32 ~ 0.43 Ω at 20 °C (68 °F)



4. Wiring connections

- Check the connections of the entire charging system. Refer to "CIRCUIT DIAGRAM".



Replace the rectifier/regulator.

OUT OF SPECIFICATION

Replace the pickup coil/stator assembly.

POOR CONNECTION

Properly connect the charging system.

LIGHTING SYSTEM

CIRCUIT DIAGRAM (See 294 page)

ELECTRICAL COMPONENTS

TROUBLESHOOTING

IF THE HEADLIGHT AND/OR TAILLIGHT FAIL TO COME ON:

Procedure

Check

1. Battery
2. Main switch

3. Light switch
4. Wiring connections(the entire lighting system)

NOTE:

- Remove the following part(s) before troubleshooting:
 1. Console
 2. Front luggage carrir
 3. Front covering parts
- Use special tool(s) for troubleshooting.

2. Battery

• Check the battery condition. Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.
Open-circuit voltage
12.8 V or more at 20 °C (68 °F)

↓ CORRECT

3. Main switch

Refer to “CHECKING THE SWITCH”.

↓ CORRECT

4. Light switch

Refer to “CHECKING THE SWITCH”.

↓ CORRECT

5. Wiring connection

• Check the connections of the entire lighting system. Refer to “CIRCUIT DIAGRAM”.

↓ CORRECT

Check the condition of each of the lighting system’s circuits. Refer to “CHECKING THE LIGHTING SYSTEM”.

INCORRECT

• Clean the battery terminals.
 • Recharge or replace the battery

INCORRECT

Replace the main switch.

INCORRECT

Replace the light switch.

POOR CONNECTION

Properly connect the lighting system.

ELECTRICAL COMPONENTS

CHECKING THE LIGHTING SYSTEM

1. If the headlights fail to come on:

(1). Bulb and bulb socket

• Check the bulb and bulb socket for continuity.

NO CONTINUITY

CONTINUITY

Replace the bulb and/or bulb socket.

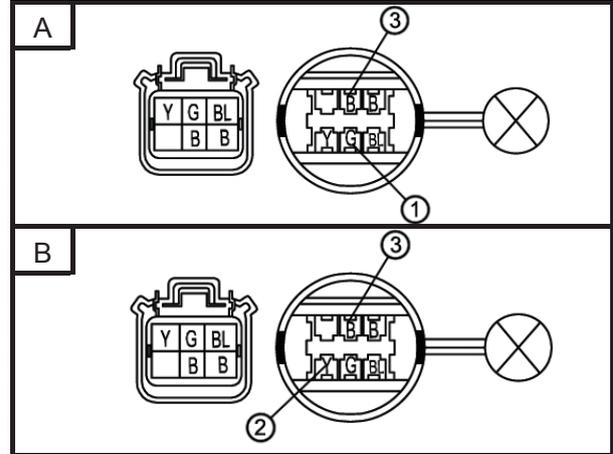
(2). Voltage

• Connect the pocket tester (DC 20 V) to the headlight couplers.

Tester (+) lead →
Green terminal ① or Yellow terminal ②
Tester (-) lead → Black terminal ③

A When the light switch is on “”.
B When the light switch is on “”

• Turn the main switch to “ON”.
 • Turn the light switch to “” or “”.
 • Check the voltage (12 V) of the “Green” and “Yellow” leads on the bulb socket connector.



OUT OF SPECIFICATION

MEETS SPECIFICATION

This circuit is not faulty.

The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

ELECTRICAL COMPONENTS

2. If the taillights fail to come on:

(1). Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

CONTINUITY

NO CONTINUITY

Replace the bulb and/or bulb socket.

(2) . Voltage

- Connect the pocket tester (DC 20 V) to the tail/brake light couplers.

Tester (+) lead → Blue lead terminal ①

Tester (-) lead → Black lead terminal ②

- Turn the main switch to "ON".
- Turn the light switch to "D" or "D".

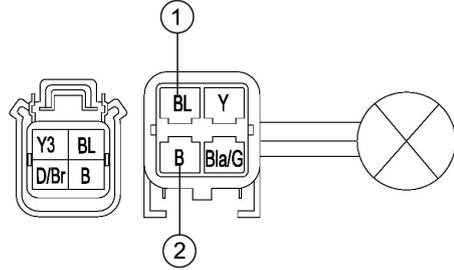
- Check the voltage (12 V) of the "Blue" lead on the bulb socket connector.

MEETS SPECIFICATION

This circuit is not faulty.

OUT OF SPECIFICATION

The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.



SIGNALING SYSTEM

CIRCUIT DIAGRAM (See 295 page)

ELECTRICAL COMPONENTS

TROUBLESHOOTING

IF A BRAKE LIGHT, AN INDICATOR LIGHT, OR THE WARNING LIGHT FAILS TO COME ON:

Procedure

Check:

1. Battery
2. Main switch
3. Wiring connections (the entire signal system)

NOTE:

• Remove the following part(s) before troubleshooting:

1. Console
2. Front frame
3. Front pedal

• Use special tool(s) for troubleshooting.

1. Battery

- Check the battery condition. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

Open-circuit voltage

12.8 V or more at 20 °C (68 °F)

CORRECT
↓

INCORRECT

- Clean the battery terminals.
- Recharge or replace the battery.

2. Main switch

Refer to "CHECKING THE SWITCH".

CORRECT
↓

INCORRECT

Replace the main switch

3. Wiring connections

- Check the connections of the entire signal system. Refer to "CIRCUIT DIAGRAM".

CORRECT
↓

POOR CONNECTION

Properly connect the signal system.

Check the condition of each of the signal system's circuits. Refer to "CHECKING THE SIGNAL SYSTEM".

ELECTRICAL COMPONENTS

CHECKING THE SIGNAL SYSTEM

1. If the brake lights fail to come on:

(1). Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

CONTINUITY

NO CONTINUITY

Replace the bulb and/or bulb socket.

(2). Brake light switch

Refer to "CHECKING THE SWITCH".

CONTINUITY

NO CONTINUITY

Replace the brake light switch.

(3). Voltage

- Connect the pocket tester (DC 20 V) to the bulb socket connector.

Tester (+) lead → Yellow terminal ①

Tester (-) lead → Black terminal ②

- Turn the main switch to "ON".
- Turn the light switch to "D" or "D".

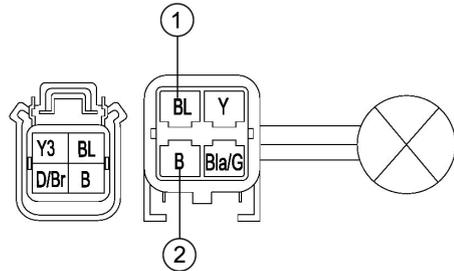
- Check the voltage (12 V) of the "Yellow" lead on the bulb socket connector.

MEETS SPECIFICATION

This circuit is not faulty.

OUT OF SPECIFICATION

The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.



ELECTRICAL COMPONENTS

2. If L, H, N, R, light is not bright

(1). Gear position switch

Refer to "CHECKING THE SWITCH".

CONTINUITY

NO CONTINUITY

Replace the gear position switch

(2). Wire connection

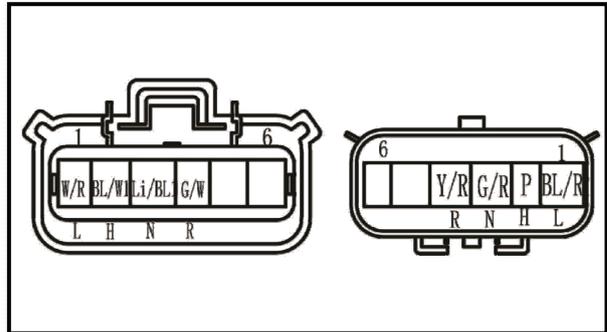
Check the main beam connected to the gear switch connector is strong

CONNECTION IS FIRM

NO CONTINUITY

Repair the main beam connection with gear switch connector

This circuit is not faulty.



ELECTRICAL COMPONENTS

3. If the parking brake indicator light fails to come on:

(1). Brake switch

Refer to "CHECKING THE SWITCH".

CONTINUITY

NO CONTINUITY

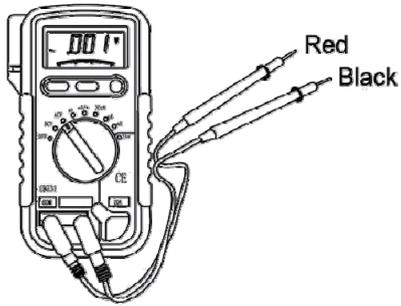
Replace the parking brake switch

(2). Voltage

Set the multimeter to DC12V, test the brake lamp voltage at both ends

Red power meter pens → ①

Black power meter pens → ②

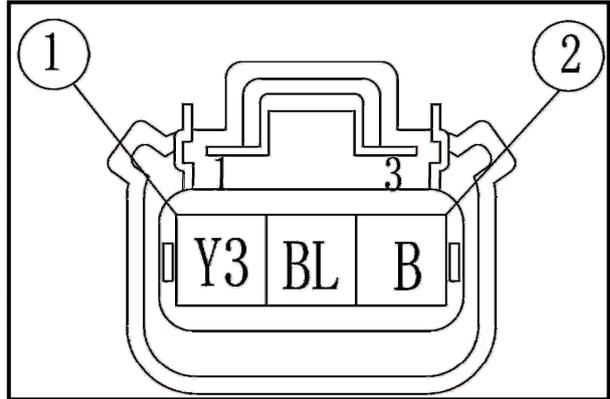


DISPLAY +12V

This circuit is not faulty.

NO VOLATGE DISPLAY

Replace the fuse F2



ELECTRICAL COMPONENTS

4. If the reverse indicator light fails to come on:

(1). Directional signal switch

Refer to "CHECKING THE SWITCH".



CONTINUITY

NO CONTINUITY



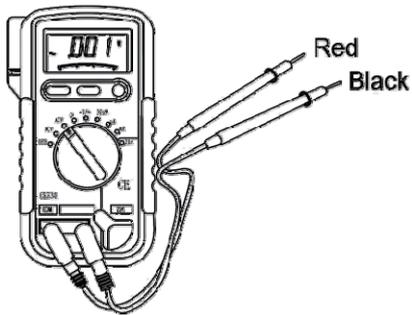
Replace the Reverse switch

(2). Voltage

Set the multimeter to DC12V, test the direction lamp voltage at both ends

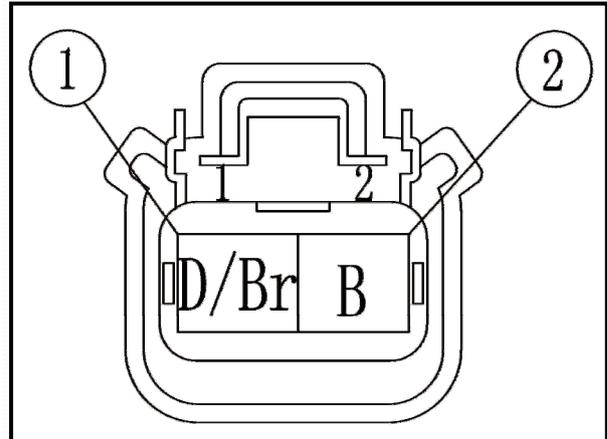
Red power meter pens → ①

Black power meter pens → ②



DISPLAY +12V

This circuit is not faulty.



NO VOLATGE DISPLAY



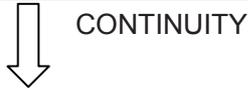
Replace the fuse F2

ELECTRICAL COMPONENTS

5. If the coolant temperature warning light does not come on when the main switch to “ON”, or if the coolant temperature warning light does not come on when the temperature is high (more than 117 ~ 123 °C (242.6 ~ 253.4 °F):

(1). Connection reliability

Check whether the wire connected to the sensor is strong



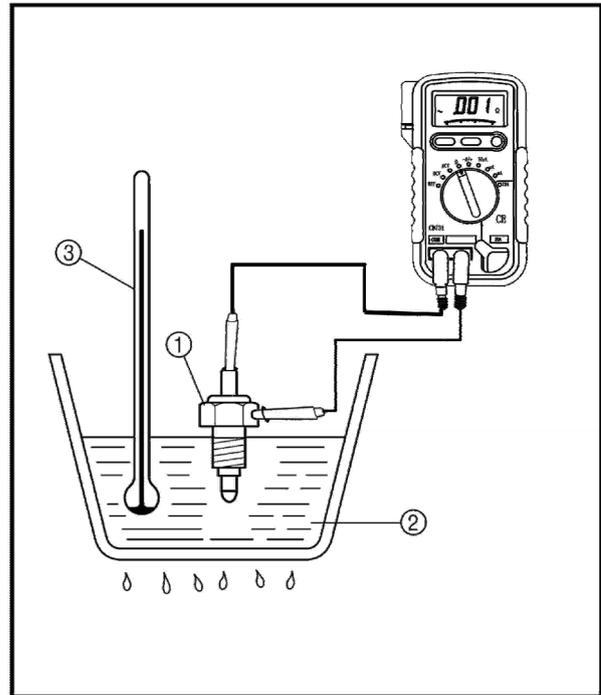
NO CONTINUITY



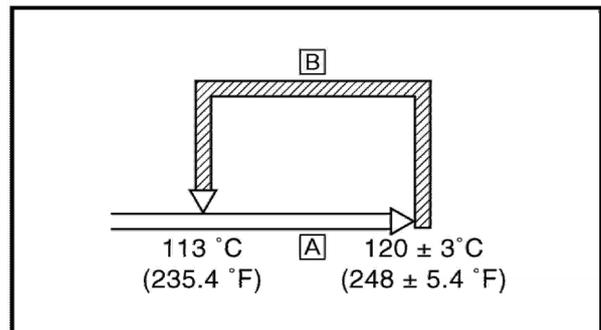
Repair joint connector

(2). Thermo switch 1

- Remove the thermo switch 1 from the cylinder head.
 - Connect the pocket tester ($\Omega \times 1$) to the thermo switch 1 ①.
 - Immerse the thermo switch 1 in coolant ②.
 - Check the thermo switch 1 for continuity. While heating the coolant use a thermometer ③ to record the temperatures.
- Ⓐ The thermo switch 1 circuit is open and the coolant temperature warning light is off.
- Ⓑ The thermo switch 1 circuit is closed and the coolant temperature warning light is on.



Test step	Coolant temperature	Continuity
1	Less than 120 ± 3 °C (248 ± 5.4 °F)	No
2	More than 120 ± 3 °C (248 ± 5.4 °F)	Yes
3	More than 113 °C (235.4 °F)	Yes
4	Less than 113 °C (235.4 °F)	No



ELECTRICAL COMPONENTS

Test steps 1 & 2: Heating phase

Test steps 3 & 4: Cooling phase

WARNING:

Handle the thermo switch 1 with special care.

Never subject it to a strong shock or allow it to be dropped. Should it be dropped, it must be replaced.

BAD CONDITION

Replace the thermo switch 1

COOLING SYSTEM

CIRCUIT DIAGRAM (See 296 page)

ELECTRICAL COMPONENTS

TROUBLESHOOTING

IF THE FAN MOTOR DOES NOT MOVE:

Procedure

Check:

1. Battery
2. Main switch
3. Radiator fan motor

4. Thermo switch 3

5. Wiring connection(the entire cooling system)

NOTE:

• Remove the following part(s) before troubleshooting.

1. Console
2. Front frame
3. Front pedal

• Use special tool(s) for troubleshooting.

1. Battery

• Check the battery condition. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

**Open-circuit voltage:
12.8 V or more at 20 °C (68 °F)**

↓ CORRECT

INCORRECT

- Clean the battery terminals.
- Recharge or replace the battery

2. Main switch

Refer to "CHECKING THE SWITCH".

↓ CORRECT

INCORRECT

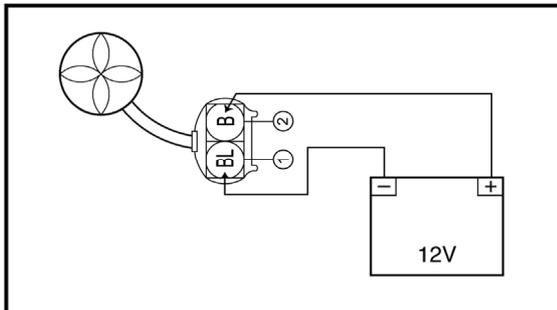
Replace the main switch.

3. Radiator fan motor

- Disconnect the radiator fan motor coupler.
- Connect the battery (12 V) as shown.

Battery (+) lead → Blue terminal ①

Battery (-) lead → Black terminal ②



- Check the operation of the radiator fan motor.

DOES NOT TURN

Replace the radiator fan motor.

ELECTRICAL COMPONENTS

4. Thermo switch 3

- Remove the thermo switch 3 from the radiator.
- Connect the pocket tester ($\Omega \times 1$) to the thermo switch 3 ①.
- Immerse the thermo switch 3 in coolant ②.
- Check the thermo switch 3 for continuity. While heating the coolant use a thermometer ③ to record the temperatures.

- Ⓐ The thermo switch 3 circuit is closed.
- Ⓑ The thermo switch 3 circuit is open.

Test step	Coolant temperature	Continuity
1	Less than $75 \pm 3 \text{ }^\circ\text{C}$ ($167 \pm 5.4 \text{ }^\circ\text{F}$)	No
2	More than $75 \pm 3 \text{ }^\circ\text{C}$ ($167 \pm 5.4 \text{ }^\circ\text{F}$)	Yes
3	More than $68 \text{ }^\circ\text{C}$ ($154.4 \text{ }^\circ\text{F}$)	Yes
4	Less than $68 \text{ }^\circ\text{C}$ ($154.4 \text{ }^\circ\text{F}$)	No

Test steps 1 & 2: Heating phase

Test steps 3 & 4: Cooling phase

WARNING:

Handle the thermo switch 3 with special care.

Never subject it to a strong shock or allow it to be dropped. Should it be dropped, it must be replaced.

Thermo switch 3

28 Nm (2.8 m · kg, 20 ft · lb)

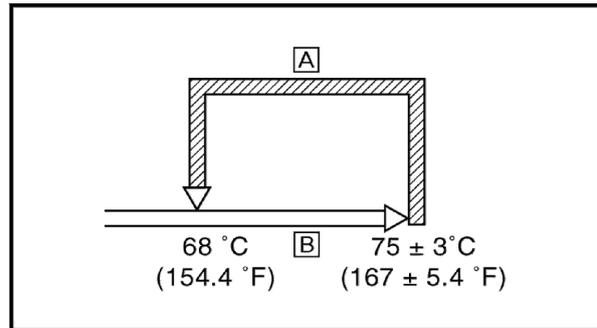
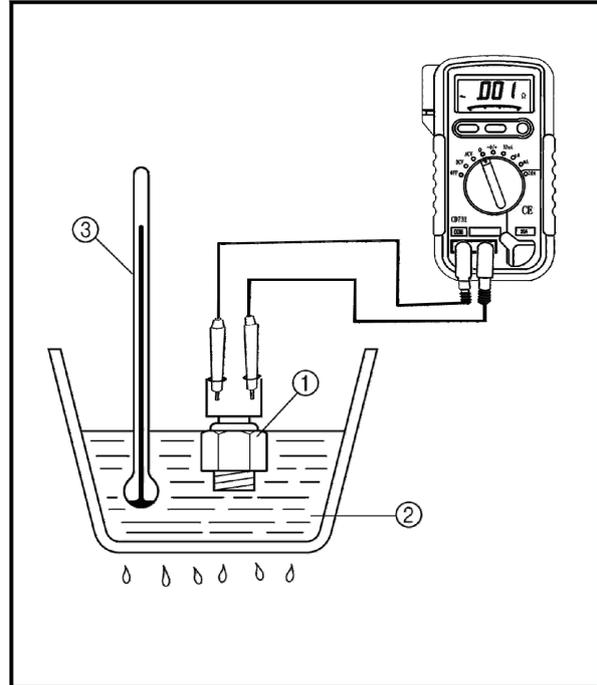
↓ GOOD CONDITION

5. Wiring connection

- Check the connections of the entire starting system. Refer to "CIRCUIT DIAGRAM"

↓ CORRECT

This circuit is not faulty.



BAD CONDITION

Replace the thermo switch 3

POOR CONNECTION

Properly connect the cooling system.

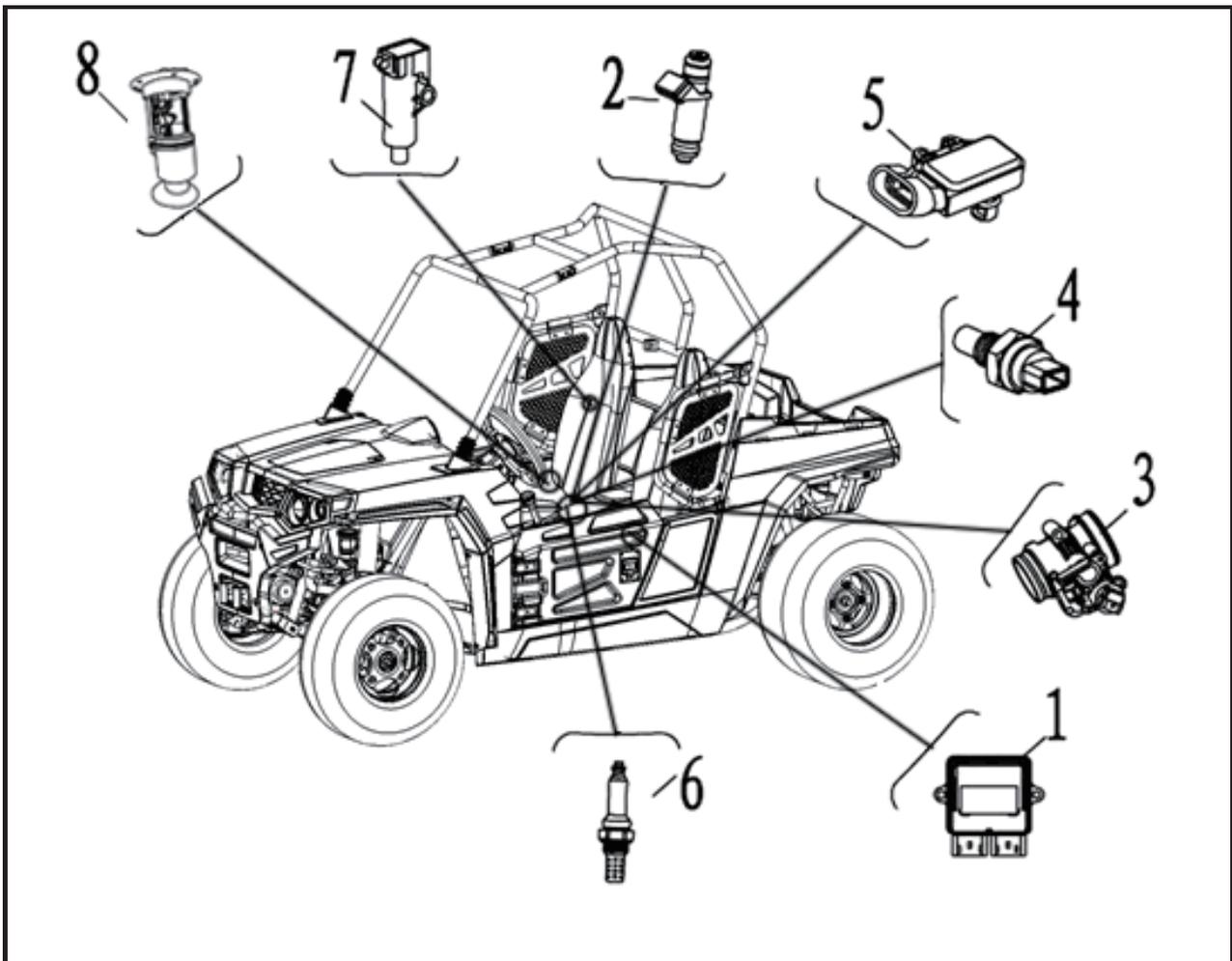
ENGINE MANAGEMENT SYSTEM

INTRODUCTION

EMS (Engine Management System)

EMS is a self contained set of components including a custom built computer and sensors and actuators which control the operation of an engine by monitoring the engine speed, load and temperature and providing the ignition spark at the right time for the prevailing conditions and metering the fuel to the engine in the exact quantity required.

Typical Components Of EMS



1. Electronic Control Unit

2. Multec 3.5 Injectors

3. Throttle Body Assembly (with stepper motor)

4. Engine Coolant Temperature Sensor

5. Intake Air Pressure and Temperature Sensor

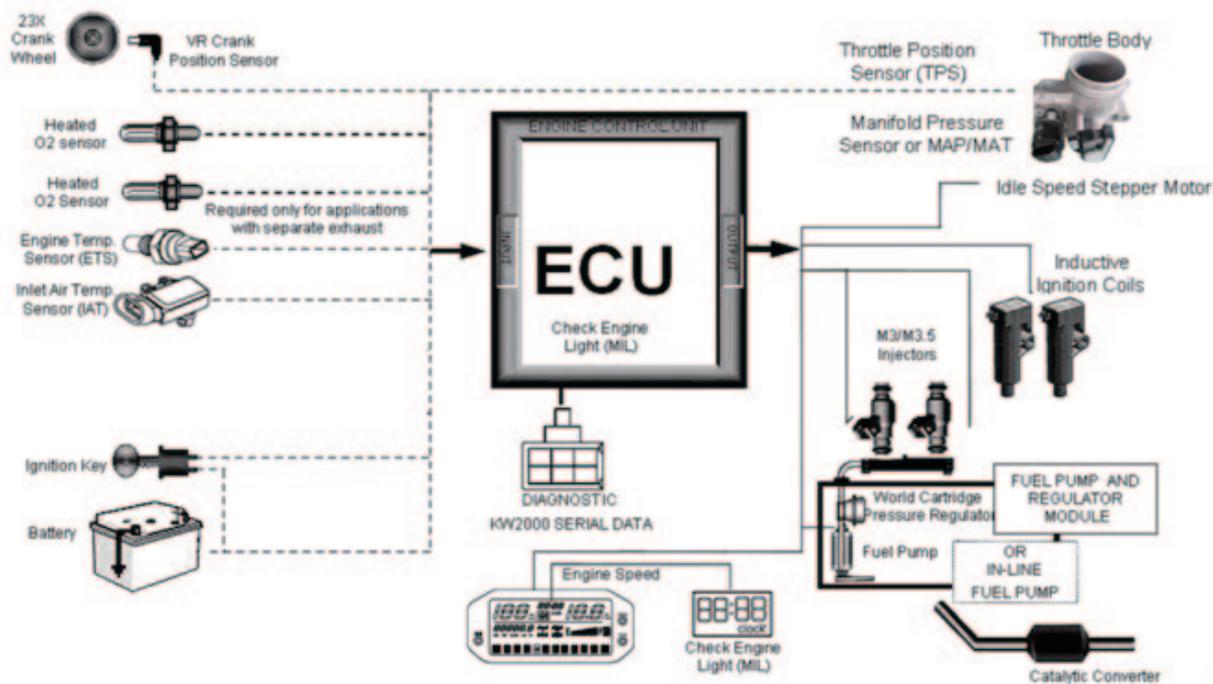
6. Oxygen Sensor

7. Ignition Coil

8. Fuel Pump Module

ENGINE MANAGEMENT SYSTEM

Layout of EMS Components



Legend:

----- Dotted line indicates inputs

_____ Solid line indicates outputs

ENGINE MANAGEMENT SYSTEM

COMPONENTS OF EMS

Electronic Control Unit

1. Description & Working Principle

The ECU continuously monitors the operating conditions of the engine through the system sensors. It also provides the necessary computation, adaptability, and output control in order to minimize the tailpipe emissions and fuel consumption, while optimizing vehicle drivability for all operating conditions. The ECU also provides diagnosis when system malfunctions occur.

2. Handling – DOs & DONTs

ECU Handling	
ACTION	REASON
DO NOT: Place the ECU close to the exhaust pipe or Engine when removed	High temperature might reduce the life of the ECU and also can damage the ECU
DO NOT: Place the ECU close to or pour water, oil or any other liquids.	ECU is susceptible to water and liquids
DO NOT: Allow mud or other debris to accumulate on the surface of the ECU	Having mud or debris accumulated on the ECU casing reduces its heat dissipation efficiency.
DO NOT: Apply any voltage relative to any point to the ECU	Drastically affects the performance of the ECU and may lead to ECU damage
DO NOT: Clean ECU with any solvent or any corrosive liquid	Can damage the housing of the ECU
DO: Take extreme care that water droplets or excess moisture should not fall on ECU connectors	ECU connectors can get short and may lead to ECU damage
DO: Clean the ECU with a moist cloth and keep it dry	Prevents ECU damage

3. Installation requirements

The ECU shall be mounted using M5 machined screws with a torque of 3.9Nm \pm 10%. The mounting surface should also be flat to avoid subjecting the base plate to unnecessary force and warping the PCB.

4. Maintenance service and Repair

ECU is a non-serviceable part. Once there are problems, it's important to first determine if the problem is caused by software/calibration. If it is caused by software/calibration, please refer to software/calibration reflashing procedure. In the event of ECU hardware failure or malfunction (during warranty period only) the ECU should be sent back to the vehicle manufacturer giving complete details of the ECU Part No, Serial number, Vehicle Model & Make, manufacturing Date, Total kms run on the vehicle, Location of use, Vehicle No, Date of return.

ENGINE MANAGEMENT SYSTEM

Multec 3.5 Injectors

1. Description and Working Principle

The Multec 3.5 Fuel Injector is an electromechanical device. A magnetic field is generated as voltage is applied to the solenoid coil.

The resulting magnetic force lifts the core assembly, overcoming manifold vacuum, spring force, and fuel pressure, allowing fuel to pass through the ball and seat interface to the director.

As the fuel passes through the director, an atomized spray is developed. The injector closes when the voltage is removed, cutting off the fuel flow.

2. Handling - DOs & DONTs

3.5 FUEL INJECTOR HANDLING	
ACTION	REASON
DO NOT: Re-use injector seal rings if at all possible. If no other choice exists, take extra care in inspecting the seal rings for damage.	Leakage.
DO NOT: Dip injector tips into lubricants.	Can plug injector spray orifices.
DO NOT: Cycle injector repeatedly without fuel pressure.	Damage to internal mechanical components.
DO NOT: Pulse (actuate) a suspected high leak rate injector (leak >50 sccm air).	Can dislodge internal contamination if present and preclude root cause analysis.
DO NOT: Allow water to enter fuel system from air lines, etc. during leak checks.	Can damage injectors.
DO NOT: Contact or apply load to the injector tip for installation.	Apply load to 45 deg angle on nylon over mold see
DO NOT: Pound injectors into manifold during assembly to engine.	Can damage injectors or seal rings.
DO NOT: Apply excessive side loads to electrical connectors.	May cause loss of electrical continuity.
DO NOT: Use any dropped unit.	Internal damage may have occurred.
DONOT: Store injectors, rails, or subassemblies including engines on which the injectors have been installed in an unprotected environment.	External contamination can damage the injector electrically and/or mechanically.
DO NOT: Use the injector as a handle.	Do not use the injector to lift assemblies
DO NOT: Rack, stage, or handle parts in a manner that allows contact between parts.	Damage will occur.
DO NOT: Remove packing in a way that allows contact between parts.	Damage could occur due ton contact between parts.

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DO NOT: Tap on fuel injectors to correct any malfunction.	Can damage injector.
DO NOT: Replace the injector with other part number not recommended for this application	Will severely affect the performance of the injector
DO: Take extra care when installing new fuel seal ring over injector inlet flange.	Prevent tearing seal ring during installation.
DO: Use proper lubricants on seal ring surfaces to install injector in engine. Minimize time between applying lubricant and inserting injector / rail.	Avoid damage to seal ring during installation. Avoid contamination at seal.
DO: Pulse (actuate) stuck closed or tip-leak suspected injector (Actuate consists of one pulse <5 sec duration at 9 to 15V).	To verify the injector failure
DO: Pulse (actuate) injectors prior to a dry fuel system leak test at engine/vehicle assembly to reseal injector valves.	Injector valves may not reseal without fuel after shipping and handling resulting in false leakage.
DO: Avoid any liquid contamination in the injector area.	Coil could short circuit.
DO: Use care during connection of harness to injector.	Avoid terminal damage.
DO: Use recommended terminal lubricant on mating connector.	Minimize potential for terminal fretting corrosion.
DO: Return any dropped, damaged, or suspect material with a tag that describes the problem.	Ensure fast and correct diagnosis of root cause.

3. Installation guidelines

Follow these guidelines to prevent damage to the injector and its electrical interface during the replacement or re-installation process.

- Lubrication: Apply a light coating of lubricant to the lower injector seal ring. ISO 10 light mineral oil or equivalent is recommended.
- The preferred technique is to apply the lubricant to the sockets the injectors are being installed into, rather than directly to the seal ring itself. This will help minimize the possibility of injector contamination.
- Avoid applying lubricant over the director plate holes – this may restrict injector flow. Do not dip the injector tip in lubricant.
- Multec 3.5 injectors come from the factory with the seal rings attached. The re-use of seal rings is not preferred when replacing an injector. If an injector is to be re-used, and no new seal rings are available, take care to inspect each seal ring for signs of damage. Even minor defects in the seal ring can lead to leakage. Take extra care in installing seal ring over flange of injector inlet.

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- Carefully installing the harness connector will prevent terminal damage. Listen for a positive audible click from the connector retention device — this ensures that it is fully engaged. Shut off ignition.
- Disconnect negative battery cable to avoid possible fuel discharge if an accidental attempt is made to start the engine.
- Disconnect the electrical connector from the injector wiring harness.
- Relieve fuel pressure
- Remove the retaining clip from the fuel injector.
- Remove the fuel line connection from the injector
- Carefully clean debris from the interface surfaces. Do not damage seal mating surfaces.
- Remove the injector from the manifold
- Apply a light coating of a lubricant to both the upper and lower injector seal ring of the replacement injector.
- Install the new injector into the manifold. Check that the injector is installed in the original orientation to maintain proper spray targeting, and that the retaining clip is properly seated on the injector and the fuel line
- Install the retaining clip after connecting the fuel line
- Tighten the injector mounting to the desired torque as mentioned in the manufacturer manual
- Tighten the fuel line
- Re-install the injector electrical connector
- Check for fuel leaks with the key “on” and the engine “off”
- Start engine and verify proper operation.
- or spray pattern, do not rotate the injector in the fuel rail assembly to install the injector electrical connector. This may dislodge the retaining clip, and result in improper spray orientation

4. Replacement Techniques

WARNING:

The injector and all associated hardware may be extremely hot.

- Shut off ignition.
- Disconnect negative battery cable to avoid possible fuel discharge if an accidental attempt is made to start the engine.
- Disconnect the electrical connector from the injector wiring harness.
- Relieve fuel pressure
- Remove the retaining clip from the fuel injector.
- Remove the fuel line connection from the injector
- Carefully clean debris from the interface surfaces. Do not damage seal mating surfaces.
- Remove the injector from the manifold
- Apply a light coating of a lubricant to both the upper and lower injector seal ring of the replacement injector.
- Install the new injector into the manifold. Check that the injector is installed in the original orientation to maintain proper spray targeting, and that the retaining clip is properly seated on the injector and the fuel line

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- Install the retaining clip after connecting the fuel line
- Tighten the injector mounting to the desired torque as mentioned in the manufacturer manual
- Tighten the fuel line
- Re-install the injector electrical connector
- Check for fuel leaks with the key “on” and the engine “off”
- Start engine and verify proper operation.

5. Plugging

Fuel deposits cause plugging resulting in flow shifts over the life of the injector. Fuel varnish or gumming, a type of injector deposit, is created when certain types of fuel are heated by high injector tip temperatures at soak (no fuel flow). Deposit build up in the director holes causes the flow shifts

- Plugging can cause flow restrictions, frictional changes and the collection of other particles attracted by the tacky surface. The flow restrictions can degrade emissions and drivability.
- Other fuel and environmental conditions may cause crystal or corrosion growth in the injector and cause a flow shift.
- Oxidation stability of the gasoline affects the potential for deposit formation and must be controlled by the fuel supplier.
- Increased levels of detergent additives reduce the rate of injector plugging.
- In case of plugging of injector follow the injector cleaning procedure mentioned in the section below

6. Cleaning Procedure

- Electrically disable the fuel pump by removing the fuel pump connection.
- Relieve the fuel pressure in the system and disconnect the fuel connection at the injector. Plug the fuel feed line.
- Injector cleaner with the specific ratio of the cleaner and gasoline to be mixed in the Injector cleaning tank.
- Connect the injector-cleaning tank to injector in the vehicle.
- Pressurize the injector-cleaning tank to system pressure.
- Start and idle the engine for 15- 20 minutes.
- Disconnect the injector-cleaning tank from the system and install the fuel pump connections. Connect the fuel feed line to injector.
- Start and idle the vehicle for an additional 2 minutes to ensure the residual injector cleaner is flushed from system.

Throttle Body Assembly(with stepper motor)

1. Description and Working Principle

The Throttle Body Assembly is an interactive system comprised of the following subsystems: the main casting body, bearing system, shaft and valve system, return spring system, cable interface system, throttle position sensing system, and the bypass air control system. The subsystems interact and support each other to provide all the functional

ENGINE MANAGEMENT SYSTEM

requirements, which are mentioned below -

- Control intake air flow
- Control idle air flow
- Sense throttle position - Provide position feedback to Engine Controller
- Provide reactionary force to the throttle

2. Handling – DOs and DONTs

THROTTLE BODY ASSEMBLY HANDLING	
ACTION	REASON
DO: Use care during assembly of harness to throttle body.	Avoid terminal damage.
DO: Avoid any liquid contamination in the throttle body area.	Ensure proper operation.
DO: Unload and install units one at a time from packing trays.	Damage may be done to critical components.
DO: Return any dropped, damaged, or suspect material with a tag that describes the problem. (Only warranty cases)	Ensure fast and correct diagnosis of root
DO: Remove and discard protective caps just before assembling mating components.	Protects system from contamination, which can prevent proper operation.
DO: clean the by pass passage after removing bottom cover	To ensure good idle stability
DO NOT: Use any dropped or impacted unit.	Internal damage may have occurred or emissions settings may have been upset.
DO NOT: Store units without protective caps in place.	Contamination may impair correct operation.
DO NOT: Ship or store near saltwater without protection.	Corrosion buildup may impact proper operation.
DO NOT: Exposed to environmental conditions (Moisture) prior to complete vehicle installation.	Corrosion buildup may impact proper operation.
DO NOT: Apply any voltage other than system voltage for testing.	Damage could occur.
DO NOT: Apply excessive band clamp loading	Damage could occur.
DO NOT: Remove packing in a way that allows contact between parts.	Minimum air leakage could be affected and/or other damage could occur.
DO NOT: Release the throttle cam abruptly from any position without the throttle linkage attached.	Damage could occur.
DO NOT: Let the by pass holes be blocked by dirt or foreign particles.	This could effect idle stability
DO NOT: Rake, stage, or handle parts in a manner that allows contact between parts.	Damage will occur.

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3. Throttle Body Removal

- Disconnect negative terminal of the battery
- Disconnect electric lead wire of throttle position sensor coupler, stepper motor coupler and MAP/MAT sensor coupler (if this sensor is mounted on the throttle body)
- Disconnect accelerator cable from throttle body
- Remove air cleaner outlet hose and throttle body outlet hose

4. Cleaning Procedure

If there is cover on the bottom, it may be removed and cleaned using carburetor cleaner (3M make recommended). Once the throttle body cover is removed, spray the throttle-body cleaner inside the shipping air passage, and use the brushes to gently dislodge the dirt, gum and varnish that are present. Do not let the bye pass holes be blocked by dirt or foreign particles.

5. Throttle Body Installation

- Reverse the procedure for installation noting the following:
- Adjust accelerator cable play
- Check to ensure that all removed parts are back in place.Reinstall any necessary part which have not been reinstalled

6. Precautions

- Do not submerge TPS in any cleaning fluid.
- Always open the throttle valve using the throttle cable or lever.
- Do not hold the valve at opening position by inserting tools or any sticks into the bore. The valve may be warped and the bore may be scratched. This type of damage may keep the throttle from opening easily or fully closing.
-

Engine Coolant Temperature Sensor

1. Description and Working Principle

This sensor is used in water cooled engines. It provides a resistance that varies as a function of temperature within prescribed tolerance limits. The sensor has a negative temperature coefficient of resistance. This is a non-serviceable part.

2. Installation Requirements

- Dynamic Torque Requirement: The sensor shall be hand into the application and then driven by a driver with a maximum no load speed of 400 rpm or installed to the desired torque by a hand torque wrench (5/8" hex). The recommended installation torque is:
Minimum: 20 N·m
Maximum: 25 N·m
- Static Torque Requirement: The torque required to remove the sensor from the mating hole shall be within 200% of the installation torque mentioned above.

3. Sample Cleaning

- When necessary the samples may be cleaned in isopropyl alcohol for one minute with mating connectors in place and then air-dried

Intake Air Pressure and Temperature Sensor

1. Description and Working Principle

This sensor has two functions. The first is the intake manifold air temperature, it provides a resistance that varies as a function of temperature within prescribed tolerance limits. The second is the intake manifold air pressure; it provides a voltage varies as the intake air pressure.

2. Sample Cleaning

- When necessary the samples may be cleaned in isopropyl alcohol or gasoline for one minute with mating connectors in place and then air-dried

Oxygen Sensor

1. Description and Working Principle

This sensor is a device for monitoring the residual oxygen in the exhaust of an internal combustion engine. It consists of the wide range sensor and stoichiometric sensor. Usually we use stoichiometric sensor on the small engine. It is the feedback element for engine closed loop control.

2. Installation Requirements

- Mounting Angle with Level: ≥ 10 degree
- Tightening Torque Requirement: 40-60 Nm

Ignition Coil

1. Description and Working Principle

This coil provides energy to the spark plug in the combustion chamber. The coil itself doesn't have a driver. The high voltage tower of the coil is connected to the spark plug using a high voltage cable assembly. This is a non-serviceable component.

2. Installation requirements

- The vehicle frame provides the mounting surface and mounting holes.
- Mount coil close to the spark plug and keep the plug wire length very short (less than 6").
- Mount coil away from any pick coil device. Especially, a VR type Crank / Cam sensor. Keep a Min distance of 150 mm (around 6") between coil and any VR sensor device.
- Never route the coil C- wire with the same bundle as the Crank sensor wires. There is around 200 V peak potential between C- wire and engine ground. This voltage potential could cause a noise on sensor cables.

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3. DOs and DONTs

Ignition Coil Handling	
Action	Reason
DO NOT: Install the low voltage connectors with the power applied	This might cause an unwanted secondary firing, possibly leading to personal injury
DO NOT: Use a screw driver to assist in removing secondary boots from the secondary tower. Use tools designed for secondary removal.	It is possible to damage a secondary lead in such a manner that creates an electrical path to outside the system permitting improper system operation misfire, or even possible personal injury if arcing occurs.
DO NOT: Use parts that have been dropped or display physical damage	Damaged components can lead to premature failure.
DO NOT: Scratch or apply any non approved material to the surface of the high voltage tower which mates with the high voltage secondary leads.	This can jeopardize the seal integrity of the mating surfaces which in turn can create a secondary high voltage leak path.
DO NOT: Strike any part of the ignition system with a tool or other object.	This can lead to physical damage which can cause a system malfunction or failure.
DO NOT: Permit paint or other sprayed materials to be sprayed onto the electrical connectors.	Insulating type sprays can create a high resistance or open connection. And, a conductive type spray can create an electrical short condition.
DO NOT: Support the ignition system by the wiring harness or plug wire.	These leads are not designed to support the weight of the ignition system. It can create a poor electrical connection Or become disconnected allowing the system to fall and be subjected to physical damage
DO NOT: Pierce or probe the secondary leads.	This creates an electrical path to outside the system permitting improper system operation, misfire, or even possible personal injury if arcing occurs.
DO NOT: Operate without the spark plug attached.	If a technician or mechanic comes in contact with the high voltage generated during operation, personal injury may occur. Or, if the engine is operated under this condition, unburned fuel may fill the converter area creating a potential hazard
DO NOT: Share ignition component wiring with other components, Dedicated wiring is required.	This prevents electrical cross talking between components which can lead to component malfunction.
DO NOT: Apply voltage to the ignition system other than vehicle system voltage for testing purposes.	This can cause reduced performance or an electrical malfunction of the ignition system.
DO NOT: Use high impact tools to apply the spark	Damage to the coil tower, secondary boot, or

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plug boot to the ignition secondary towers. Installation of the high voltage secondary leads by hand is preferred.	mating connection surfaces might occur.
DO: Install the secondary leads before connecting the primary leads.	In the event the low voltage connection has been made and the power applied, unwanted secondary output might occur possibly resulting in injury, damage the ignition component, and test equipment
DO: Take care when working around the ignition system.	The high voltage produced by the coil secondary circuit can cause personal injury and/or damage test equipment
DO: Proper handling and shipping methods need to be in place to reduce the risk of damage due to impact, moisture, or contamination	Damaged components can lead to premature failure.
DO: Avoid unnecessary disconnecting and connecting of the electrical components.	The electrical connections are not designed for repeated connection and disconnection.
DO: Insure the low voltage connectors are entirely seated and the locking mechanism is engaged.	This prevents intermittent electrical connections leading to an improper ignition system operation.
DO: Use approved connector breakouts when testing the ignition system.	Connector and/or component damage may occur.
DO: Insure the appropriate seals are included in the connector system.	Liquid intrusion into the terminal connection area might occur causing an electrical intermittent or short condition. In the event of severe terminal corrosion, an open condition might occur.
DO: Operate with gasoline based internal combustion engines.	Other fuels or combustion designs may require additional design considerations.
DO: The power feed line should be fused.	This could protect the system in the event of an electrical short
DO: The module heat sink and back plate must not be used as a connection point when jump starting the engine	The high level of voltage and current which the module could be subjected to, could cause module performance degradation or failure.
DO: Connection of the module back plate to vehicle ground is desirable whenever possible	This greatly reduce potential ground loops and acts as a heat transfer source from the module.
DO: The ignition system ground wire should be kept as short as possible. And, when permissible, should be grounded at the same engine block position as the engine controller	This would greatly reduce the possible of unwanted electrical ground loops.
DO: The electrical wiring to the ignition system should be routed so that the conductors are protected from excessive heat, damage, and wear.	Helps prevent electrical intermittent, open or shorted operating conditions.

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<p>DO: Ignition secondary leads should not be routed with the ignition primary harness or any other electrical harness.</p>	<p>Voltage spikes can be transmitted from the secondary cables into other leads which are in close. This could create a component performance degradation or failure condition</p>
<p>DO: Spark plug wires(secondary leads) & primary wiring:</p> <ul style="list-style-type: none"> - must not contact sharp surface - must not be under tension between fixed points - must be clear of moving parts (belts, fan, etc...) - must be protected from or kept at least 125 mm away from radiant heat source exceeding 400 F. - must be protected from environmental damage (dirt, splash, oils, fluids, etc....) - must be retained, secured or insulated to prevent pinching, mis-routing, rattles, and squeaks 	<ul style="list-style-type: none"> - Spark plug wires carry very high voltage (30,000 volt). If the secondary lead loses its dielectric characteristics thru being nicked, cut , chaffed, then an arc thru to a near by ground could take place. This kind of condition could lead to misfire, no start, or premature failure of ignition system.
<p>DO: Not all fasteners are designed for repeat use. Beware of fastener specifications. All harnesses should be supported within 6" of a mating connection.</p>	<p>Adequate retention force might not be achieved if the fastener is not designed to be reused. Mating connections are not designed to support the weight of the harness assembly.</p>
<p>DO: For removing spark plugs follow the following steps:</p> <ol style="list-style-type: none"> 1- Grasp the spark plug boot and gently 2- rotate 90°; and then pull the spark plug boot and cable away from the spark plug 3- Before removing spark plug, brush or air blast dirt away from the well areas 4- Use correct size deep socket wrench to loosen each spark plug one or two turns 	<p>To remove spark plugs from Aluminum heads, allow the engine to cool. The heat of the engine, in combination with a spark plug that is still hot, may cause the spark plug threads to strip the cylinder head upon removal</p> <p>Use goggles to protect eyes from dirt when applying compressed air to spark plug wells</p>
<p>DO: Cleaning a spark plug could be done as follow:</p> <ol style="list-style-type: none"> 1- wipe all spark plug surfaces clean....remove oil, water, dirt and moist residues. 2- If the firing end of spark plug has oily or wet deposit, brush the spark plug in an approved, non-flammable and non-toxic solvent. Then dry the spark plug thoroughly with compressed air 3- Use a propane torch to dry wet-fuel fouled plugs. Allow the torch flame to enter up the center electrode insulator. Allow plug to cool down 4- If the spark plug threads have carbon & scale deposits, clean with wire brush, taking care 	<ul style="list-style-type: none"> -Cleaning a spark plug will reduce the voltage required for an electrical arc(spark) across the electrodes -Cleaning & re-gapping will not restore a used spark plug to a new condition. It may be more economical and efficient to replace used spark plugs with new plugs instead of cleaning. -Sooted plugs should be replaced -Do not cool by using water or any liquid -Clean threads permit easier installation and proper seating which will maximize transfer heat away from the plug

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not to injure the electrode or the insulator tip	
DO: Regap spark plugs to the exact measurement specified by the engine	-Too wide a gap could cause the plug to misfire(higher required ignition voltage).
<p>manufacturer to keep the best fuel economy and proper engine performance</p> <ul style="list-style-type: none"> - Use round wire-type gauge for an accurate measure of gap on all used spark plugs - when gapping a spark plug only the side electrode is moved. The center electrode must not be moved 	<ul style="list-style-type: none"> -Too narrow of a gap could affect idle stability -A flat gauge can't accurately measure the spark plug on used plugs
DO: When replacing spark plugs with new ones, always use equivalent plugs with same heat range, thread, size, etc....	<ul style="list-style-type: none"> -Higher heat range plug(hotter plug) could lead to pre-ignition & possible piston damage -Lower heat range (colder plug) could lead to cold fouling & emission problem
<p>DO: For installing spark plugs follow the following steps:</p> <ol style="list-style-type: none"> 1- make sure the cylinder head threads and spark plug threads are clean. Make sure the spark plug thread is free of dings and burrs. If necessary, use a thread chaser and seat cleaning tool. 2- Make sure the spark plug gasket seat is clean, then thread the gasket to fit flush against the gasket seat. Tapered seat plugs do not require gaskets 3- Screw the spark plugs finger-tight into the cylinder head. Then, use a torque wrench to tighten spark plugs following manufacturer's recommendation). <p>Torque is different for various plug type & cylinder head material</p>	<ul style="list-style-type: none"> -If the thread is damage, it prevents a good heat transform from the shell to the cylinder head -Do not use any type of anti-seize compound on spark plug threads. Doing this will decrease the amount of friction between the threads. The result of the lowered friction is that when the spark plug is torqued to the proper specification, the spark plug is turned too far into the cylinder head. This increases the likelihood of pulling or stripping the threads in the cylinder head -Over-tightening of a spark plug can cause stretching of the spark plug shell and could allow blowby to pass thru the gasket seal between the shell and insulator. Over-tightening also results in extremely difficult removal

Fuel Pump Module

1. Description and Working Principle

Fuel Pump Module supplies fuel to engine at system pressure. Fuel Pump Module is mounted to fuel tank at bottom and supplies fuel to engine through hoses.

Fuel Pump module consists of Fuel Pump to generate the fuel flow and pressure regulator to regulate the fuel pressure.

Fuel Pump

When power is supplied to fuel pump, motor in pump assembly rotates the impeller. Impeller in turn draws the fuel from strainer and pumps the flow to generate the system pressure.

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Pressure Regulator

Pressure Regulator is a diaphragm type mechanical device. Fuel flow from filter enters in the inlet of pressure regulator. Pressure regulator regulates the fuel pressure at a set pressure by releasing the excessive fuel flow to fuel tank.

2. Service Procedure:

Precautions:

Before attempting any service on fuel system, following cautions should be always followed for personal safety and to avoid system damages.

- Disconnect negative cable at battery.
- DO NOT smoke, and place 'No SMOKING" sign near work area
- Make sure to have fire extinguisher handy.
- Make sure to perform work in well ventilated area and away from any open fire/flames.
- Wear Safety glasses
- To relieve fuel vapor pressure in fuel tank, remove fuel filler cap fuel filler neck and then reinstall it.
- As fuel lines are at high pressures when the engine is stopped, loosening or disconnecting fuel line will cause dangerous spout of fuel. Before loosening/ disconnecting fuel lines, please follow the "Fuel Pressure Relief Procedure" described in this section.
- Small amount of fuel may drip after the fuel lines are disconnected. In order to reduce the risk of personal injury, cover the pipe/ hose ends with suitable blind with no rust or contamination.
- After servicing, make sure that the fuel hoses and clamps are connected according to the hose fitment instructions given in vehicle instruction manual.
- After servicing, please follow the 'Fuel Leakage Check Procedure' described in this section.
- After servicing make sure to fill at least 3 liters gasoline before pump is primed (ignition key should be turned on only after ensuring there is minimum 3 liters of fuel in the fuel tank)

Fuel Module Diagnosis:

Step	Action	Yes	No
1	Switch on Ignition key. Fuel Pump primes for 3 seconds when the ignition key is ON. Check for fuel pump running noise for 3 seconds after ignition key is ON.	If fuel pump running noise can be heard, go to step 4.	If fuel pump running noise can not be heard, go to step 2.
2	Disconnect fuel module coupler. Check voltage at harness coupler. Is the voltage within 10-14V	Go to step 3	Check the electrical circuit from Ignition to fuel module.

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3	Connect 12V DC power supply (battery) to fuel module. Make sure that enough fuel available in fuel tank to avoid fuel pump running dry. Is the fuel pump running	<ol style="list-style-type: none"> 1. Check electrical circuit from fuel module to ECU 2. Check ECU 	<ol style="list-style-type: none"> 1. Check Fuel Pump Harness integrity 2. Check Fuel Pump
4	Check fuel system pressure at Injector inlet (with a T-joint) while engine is running in idle condition. Is the pressure between 220 ~ 270kPa?	Fuel Module Operation Normal	Go to Step 5
5	Is the Pressure below 220kPa?	<ol style="list-style-type: none"> 1. Check for leakages from hoses, hose joints 2. Check Fuel Pump 3. Check Pressure Regulator 	<ol style="list-style-type: none"> 1. Clogged Filter 2. Kink/ Blockage in Fuel Hoses 3. Check Regulator

3. Fuel Module Removal:

- Relieve fuel pressure in fuel lines referring to the 'Fuel Pressure Relief Procedure' provided in this section.
- Disconnect negative cable at battery.
- Disconnect fuel module wire coupler.
- Drain the fuel in fuel tank thru fuel filler with help of hand pump (siphon). Collect the fuel in approved container for contamination and safety.
- Disconnect the fuel hoses from fuel module by using standard tools
- Remove the fuel tank from vehicle.
- Place the fuel tank with bottom up condition. Care to be taken not to cause any scratches/ damages on fuel tank.
- Open the fuel module mounting bolts.
- Take out fuel module assembly from fuel tank with care
- Care to be taken not to damage the strainer while removing fuel module from tank.

4. Fuel Module Installation:

- Replace the fuel module gasket in fuel module assembly with a new one. Old/ used gaskets can cause leakages.
- Fold strainer towards fuel pump and insert fuel module in tank opening with care. Care should be taken not to cause any damages on strainer.

NOTE

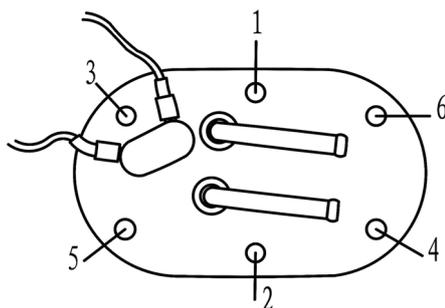
Fuel Module Orientation: Fuel module bolts not symmetrical and can be mounted only in the intended direction. Regulator side should be facing the Fuel Tank rear side. Make sure that the fuel tank surface at module mounting area is clean and free of surface defects.

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- Place the bolts on module cover and tighten the bolts gradually in star pattern sequence to apply equal compression on gasket. It is shown in figure as below. Bolt Tightening Torque: 3~4 Nm.

Fuel module is installed with special bolts (step bolts). Use designated bolts only. Follow the tightening torque and tightening sequence instruction. Over torque and miss-sequence can cause unequal compression of gasket and leakage.

- Install the fuel tank to vehicle.
- Connect for fuel hoses with suitable hose clamps.
- Connect fuel module coupler.
- Follow "Fuel Leakage Check Procedure" to check any leakage before the engine is started.



Mounting Bolts – Star Tightening Pattern

5. Pressure Regulator Assembly Replacement:

- Remove the regulator retainer from module.
- Apply gradual pull force on retainer to avoid any personal injury due to spring action of retainer.
- Take out the pressure regulator assembly from module.
- Do not hit/ damage on the regulator dome and crimping portion.
- Lubricate the O-rings in new pressure regulator assembly with recommended lubrication oils as mentioned in Table no: 3. Lubrication oil is applied only for ease of regulator assembly.
- Make sure that 2 O-rings (one is bigger diameter the other is smaller diameter) are assembled in pressure regulator.
- Place the pressure regulator on module at regulator pod. Push the regulator gently in the pod.
- Do not hit/ damage on the regulator dome and crimping portion. This will disturb the pressure setting.
- Assemble the retainer on the regulator pod
- Replace the gasket, module with new gasket provided in the kit.

6. Fuel Pressure Relief Procedure:

NOTE

This work must not be done when engine is hot. If done so, it may cause adverse effect to catalyst (if equipped)

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After making sure that engine is cold, relieve fuel pressure as follows.

- Place vehicle gear in 'Neutral'.
- Disconnect fuel module electrical coupler from vehicle harness.
- Start engine and run till it stops due to lack of fuel. Repeat ignition key ON and OFF for 2 ~ 3 times of about 3 seconds each time to relieve fuel pressure in lines. Fuel Connections are now safe for servicing.
- Upon the completion of servicing, Connect Fuel Module Connector to Vehicle Harness.

7. Fuel Leakage Check Procedure:

After performing any service on fuel system, check to make sure that there are no fuel leakages as below.

- Fill about 3 ~ 5 liters of fuel in tank.
- Turn Ignition key to ON position for 3 seconds (to operate fuel pump) and then turn to OFF position. Repeat this for 3 ~ 4 times to apply fuel pressure in fuel lines.
- In this state, check to see that there are no fuel leakage from any part of fuel system (Fuel Tank, Hoses, Hose Joints, etc)

8. Handling – DOs and DONTs:

FUEL MODULE HANDLING	
ACTION	REASON
DO NOT: Drop Fuel Module on Floor	Could cause internal damage to Fuel Pump.
DO NOT: Run Fuel Pump Dry (without fuel at pump inlet/ strainer) ensure atleast 3 litres of gasoline is present in the fuel tank	Caused internal damage to Fuel Pump
DO NOT: Damage the strainer during servicing, insertion of fuel module in fuel tank	Contamination enters fuel pump thru damaged strainer damages the Fuel Pump
DO NOT: Disassemble Fuel Pump and regulator internal parts out side Delphi premises. DO NOT: Do any adjustments on pressure regulator and pump except for replacement.	Warranty void.
DO NOT: Use module harness for hold/ carry fuel module. DO NOT: Pull Wiring Harness in vertical direction to module cover	Wiring Harness Breakage/ Fuel Pump Power disconnection
DO NOT: Use damaged/ distorted hose clamps.	Can cause fuel seepage/ leakage.

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DO NOT: Use Fuel Module if the strainer with excessive damage/ cut.	Contamination enters fuel pump thru damaged strainer damages the Fuel Pump
DO NOT: Use Fuel Pump for draining fuel in fuel tank.	Not intended function of fuel module.
DO NOT: Use module mounting bolts for mounting other components.	Affects fuel module sealing.
DO NOT: Damage fuel pump harness while servicing fuel module.	Damaged terminals will cause intermittent/ No contact for power supply.
DO NOT: Force hand pump towards fuel module while draining fuel from tank.	To avoid any damages on fuel module.
DO : Ensure that there are no damages to fuel pipes while servicing fuel module	Can cause fuel seepage/ leakage.
DO: Use genuine module gasket only.	Spurious gaskets can cause leakages.
DO: Use designated hose clamps.	To ensure no leakages/ seepages thru hose joint.
DO: Clamp fuel module harness to vehicle chassis	Clamp provides mechanical support for wiring harness in vibrations.
DO: Use only standard gasoline for operating vehicle/ module.	Fuel Module is intended to run in standard gasoline. Adulterated fuel can cause fuel module premature failures which are not covered under warranty.
DO: Change the fuel filter at recommended intervals.	Clogged fuel filter will cause restriction in fuel flow and can cause flow reduction.
DO: Use fuel filters supplied/ recommended fuel filters only.	Spurious fuel filters causes damages to injector, regulator and fuel pump performance.
DO: Ensure that the hoses are routed properly and there are no kinks / rubbing with other components.	Improper routing, kinks and fouling of hoses with other components causes hose damage
DO: Ensure that always sufficient fuel till the strainer height	Avoids Pump running in dry
DO: Replace two O-rings along with replacement/ re-installation of pressure regulator.	For proper functioning of regulator.
DO: Use care during connection of harness to module coupler.	Avoid terminal damage.
DO: Return any dropped, damaged, or suspect material with a tag that describes the problem.	Ensure fast and correct diagnosis of root cause.

ENGINE MANAGEMENT SYSTEM

EMS FAULT DIAGNOSIS

EME Fault Diagnosis

When fault comes up, the odometer's clock will turn into a number, which is a fault code, find out the cause with this number; press clock button, then it will turn back to clock mode, and five seconds later, the fault code will show again.

Fault code list

System or Component	DTC Number	DTC Description	Related Calibration
Manifold Absolute Pressure Sensor (MAP)	0107	MAP Circuit Low Voltage or Open	KsDGDM_MAP_ShortLow
	0108	MAP Circuit High Voltage	KsDGDM_MAP_ShortHigh
Intake Air Temperature Sensor (IAT)	0112	IAT Circuit Low Voltage	KsDGDM_IAT_ShortLow
	0113	IAT Circuit High Voltage or Open	KsDGDM_IAT_ShortHigh
Coolant/Oil Sensor	0117	Coolant/Oil Temperature Sensor Circuit Low Voltage	KsDGDM_CoolantShortLow
	0118	Coolant/Oil Temperature Sensor Circuit High Voltage or Open	KsDGDM_CoolantShortHigh
Throttle Position Sensor (TPS)	0122	TPS Circuit Low Voltage or Open	KsDGDM_TPS_ShortLow
	0123	TPS Circuit High Voltage	KsDGDM_TPS_ShortHigh
Oxygen Sensor	0131	O2S 1 Circuit Low Voltage	KsDGDM_O2_1_ShortLow
	0132	O2S 1 Circuit High Voltage	KsDGDM_O2_1_ShortHigh
Oxygen Sensor Heater	0031	O2S Heater Circuit High Voltage	KsDGDM_O2_HeaterShortHigh
	0032	O2S Heater Circuit Low Voltage	KsDGDM_O2_HeaterShortLow
Fuel Injector	0201	Injector 1 Circuit Malfunction	KsDGDM_INJ_CYL_A_Fault
	0202	Injector 2 Circuit Malfunction	KsDGDM_INJ_CYL_B_Fault
Fuel Pump Relay (FPR)	0230	FPR Coil Circuit Low Voltage or Open	KsDGDM_FPP_CircuitShortLow
	0232	FPR Coil Circuit High Voltage	KsDGDM_FPP_CircuitShortHigh
Crankshaft Position	0336	CKP Sensor Noisy Signal	KsDGDM_CrankNoisySignal
Sensor (CKP)	0337	CKP Sensor No Signal	KsDGDM_CrankNoSignal
Ignition Coil	0351	Cylinder 1 Ignition Coil Malfunction	KsDGDM_EST_A_Fault
	0352	Cylinder 2 Ignition Coil Malfunction	KsDGDM_EST_B_Fault
Idle Control System	0505	Idle Speed Control Error	KsDGDM_IdleControl

ENGINE MANAGEMENT SYSTEM

System Voltage	0562	System Voltage Low	KsDGDM_SysVoltLow
	0563	System Voltage High	KsDGDM_SysVoltHigh
MIL	0650	MIL Circuit Malfunction	KsDGDM_MIL_Circuit
Tachometer	1693	Tachometer Circuit Low Voltage	KsDGDM_TAC_Circuit_Low
	1694	Tachometer Circuit High Voltage	KsDGDM_TAC_Circuit_High
Oxygen Sensor 2	0137	O2S 2 Circuit Low Voltage	KsDGDM_O2_2_ShortLow
	0138	O2S 2 Circuit High Voltage	KsDGDM_O2_2_ShortHigh
Oxygen Sensor Heater 2	0038	O2S Heater 2 Circuit High Voltage	KsDGDM_O2_HeaterShortHigh
	0037	O2S Heater 2 Circuit Low Voltage	KsDGDM_O2_HeaterShortLow
Vehicle Speed Sensor	0500	VSS No Signal	KsDGDM_VSS_NoSignal
Park Neutral Switch Diag	0850	Park Neutral Switch Error	KsDGDM_ParkNeutralSwitch
CCP	0445	CCP short to high	KsDGDM_CCP_CircuitShortHigh
	0444	CCP short to low/open	KsDGDM_CCP_CircuitShortLow
BLM MaxAdapt	0171	BLM Max Adapt(Kohler Special)	KsFDIAG_BLM_MaxAdapt
BLM MinAdapt	0172	BLM Min Adapt(Kohler Special)	KsFDIAG_BLM_MinAdapt
PE system Lean	P0174	PE syst Lean(Kohler Special)	KsFDIAG_PESystLean

TROUBLESHOOTING

NOTE:

The following trouble, not including all possible troubles, is a help for trouble guide. Please refer to relevant contents for the inspection, adjustment and replacement of part.

STARTING FAILURE/HARD STARTING

FUEL SYSTEM	
Fuel tank	<ol style="list-style-type: none"> 1、 No oil 2、 Fuel filter is clogged 3、 Fuel pump filter net is clogged 4、 Breather tube is clogged 5、 Fuel is deteriorated or polluted
Fuel pump	<ol style="list-style-type: none"> 1、 Clogged fuel hose 2、 Damaged vacuum hose
Air filter	Clogged air filter element
Gasoline filter	Block up
ELECTRICAL SYSTEM	
Spark plug	<ol style="list-style-type: none"> 1、 Improper plug gap 2、 Worn electrodes 3、 Wire between terminals broken 4、 Wrong Spark plug heat value 5、 Faulty spark plug cap 6. High voltage wires strapped on frame cause shortage of high pressure ignition energy
EFI system	<ol style="list-style-type: none"> 1、 Broken ECU 2、 Clogged nozzle or the rupture the line from nozzle to ECU 3、 Damage of engine speed signal sensor 4、 Rupture of the line from engine speed signal sensor to ECU 5、 Broken inlet pressure or temperature sensor or damaged line to ECU 6、 Broken air throttle or damage line to ECU. 7、 Broken vice line (cable) of electrical injection
Switches and wires	<ol style="list-style-type: none"> 1、 Broken main cable 2、 Broken main switch

TROUBLESHOOTING

Starter motor	<ol style="list-style-type: none"> 1、 Faulty starter motor 2、 Faulty starter relay 3、 Faulty overrunning clutch in engine 4、 Broken main switch 5、 Broken main fuse
Battery	<ol style="list-style-type: none"> 1、 Low battery voltage 2、 Faulty battery
COMPRESSION SYSTEM	
Cylinder and cylinder head	<ol style="list-style-type: none"> 1、 Loose spark plug 2、 Loose cylinder head or cylinder 3、 Broken cylinder head gasket 4、 Broken cylinder gasket 5、 Worn, damaged or seized cylinder
Piston and piston rings	<ol style="list-style-type: none"> 1、 Improperly installed piston ring 2、 Worn, fatigued or broken piston ring 3、 Seized piston ring 4、 Seized or damaged piston
Valve, camshaft and crankshaft	<ol style="list-style-type: none"> 1、 Improperly sealed valve 2、 Improperly contacted valve and valve seat 3、 Improper valve timing 4、 Broken valve spring 5、 Seized camshaft
Crankcase and crankshaft	<ol style="list-style-type: none"> 1、 Improperly seated crankcase 2、 Seized crankshaft
Valve train	<ol style="list-style-type: none"> 1、 Improperly adjusted valve clearance 2、 Improperly adjusted valve timing

POOR IDLE SPEED PERFORMANCE

POOR IDLE SPEED PERFORMANCE	
EFI system	<ol style="list-style-type: none"> 1、 Broken ECU 2、 Clogged nozzle or the rupture the line from nozzle to ECU 3、 Damage of engine speed signal sensor 4、 Rupture of the line from engine speed signal sensor to ECU 5、 Broken inlet pressure or temperature sensor or damaged line to ECU 6、 Broken air throttle or damage line to ECU. 7、 Broken vice line (cable) of electrical injection

TROUBLESHOOTING

Electrical system	<ol style="list-style-type: none"> 1、 Faulty ignition plug 2、 The performance of speed sensor become poor 3、 Faulty ignition coil
Valve train	Improperly adjusted valve clearance
Air filter	Clogged air filter element

POOR MEDIUM AND HIGH-SPEED PERFORMANCE

POOR MEDIUM AND HIGH-SPEED PERFORMANCE	
EFI system	<ol style="list-style-type: none"> 1、 Broken ECU 2、 The performance of speed signal sensor become poor 3、 The main nozzle clog or loose 4、 Spoiled or pollute oil 5、 Broken inlet pressure / temperature sensor 6、 Air throttle position sensor loose
Air filter	Clogged air filter element
Muffler	Clogged muffler
Set out	The reverse signal error trigger

FAULTY GEAR SHIFTING

SHIFT LEVER DOES NOT MOVE	
Shift drum, shift forks	<ol style="list-style-type: none"> 1、 Groove jammed with impurities 2、 Seized shift fork 3、 Bent shift fork guide bar 4、 Broken shift guide
Transmission	<ol style="list-style-type: none"> 1、 Seized transmission gear 2、 Incorrectly assembled transmission
Shift guide	<ol style="list-style-type: none"> 1、 Broken shift guide mechanism 2、 Broken shift flexible shaft
JUMPS OUT OF GEAR	
Shift forks	Worn shift fork
Shift drum	<ol style="list-style-type: none"> 1、 Improper thrust play 2、 Worn shift drum groove
Transmission	Worn gear dog

TROUBLESHOOTING

ENGINE OVERHEATING

OVERHEATING	
Ignition system	<ol style="list-style-type: none">1、 Improper spark plug gap2、 Improper spark plug heat range
Fuel system	<ol style="list-style-type: none">1、 Improper fuel level2、 Clogged air filter element
Compression system	Heavy carbon deposit
Engine oil	<ol style="list-style-type: none">1、 Improper oil level2、 Improper oil viscosity3、 Inferior oil quality
Brake	Brake drag
Cooling system	<ol style="list-style-type: none">1、 Low coolant level2、 Clogged or damaged radiator3、 Damaged or faulty water pump4、 Faulty fan motor5、 Faulty thermo switch
Oil cooling system	Clogged or damaged oil cooler

FAULTY BRAKE

POOR BRAKING EFFECT	
Disc brake	<ol style="list-style-type: none">1、 Worn brake pads2、 Worn disc3、 Air in brake fluid4、 Leaking brake fluid5、 Faulty master cylinder kit cup6、 Faulty caliper kit sea7、 Loose union bolt8、 Broken brake hose and pipe9、 Oily or greasy disc/brake pads10、 Improper brake fluid level

TROUBLESHOOTING

SHOCK ABSORBER MALFUNCTION

Loss of damping function	
Shock absorber	<ol style="list-style-type: none"> 1、 Bent or damaged damper rod 2、 Damaged oil seal lip 3、 Fatigued shock absorber spring

UNSTABLE HANDLING

UNSTABLE HANDLING	
Steering column	Improperly installed or bent
Steering	<ol style="list-style-type: none"> 1、 Incorrect toe-in 2、 Bent steering shaft 3、 Improperly installed steering shaft 4、 Damaged bearing 5、 Bent tie-rods
Tires	<ol style="list-style-type: none"> 1、 Uneven tire pressures on both sides 2、 Incorrect tire pressure 3、 Uneven tire wear
Rim	<ol style="list-style-type: none"> 1、 Deformed wheel 2、 Loose bearing 3、 Bent or loose wheel axle
Frame	<ol style="list-style-type: none"> 1、 Bent 2、 Damaged frame
Suspension	<ol style="list-style-type: none"> 1、 Over worn or loosen main knuckle ball stud 2、 Bent rocker 3、 Broken shock absorber 4、 Broken buffer rubber of rocker shaft

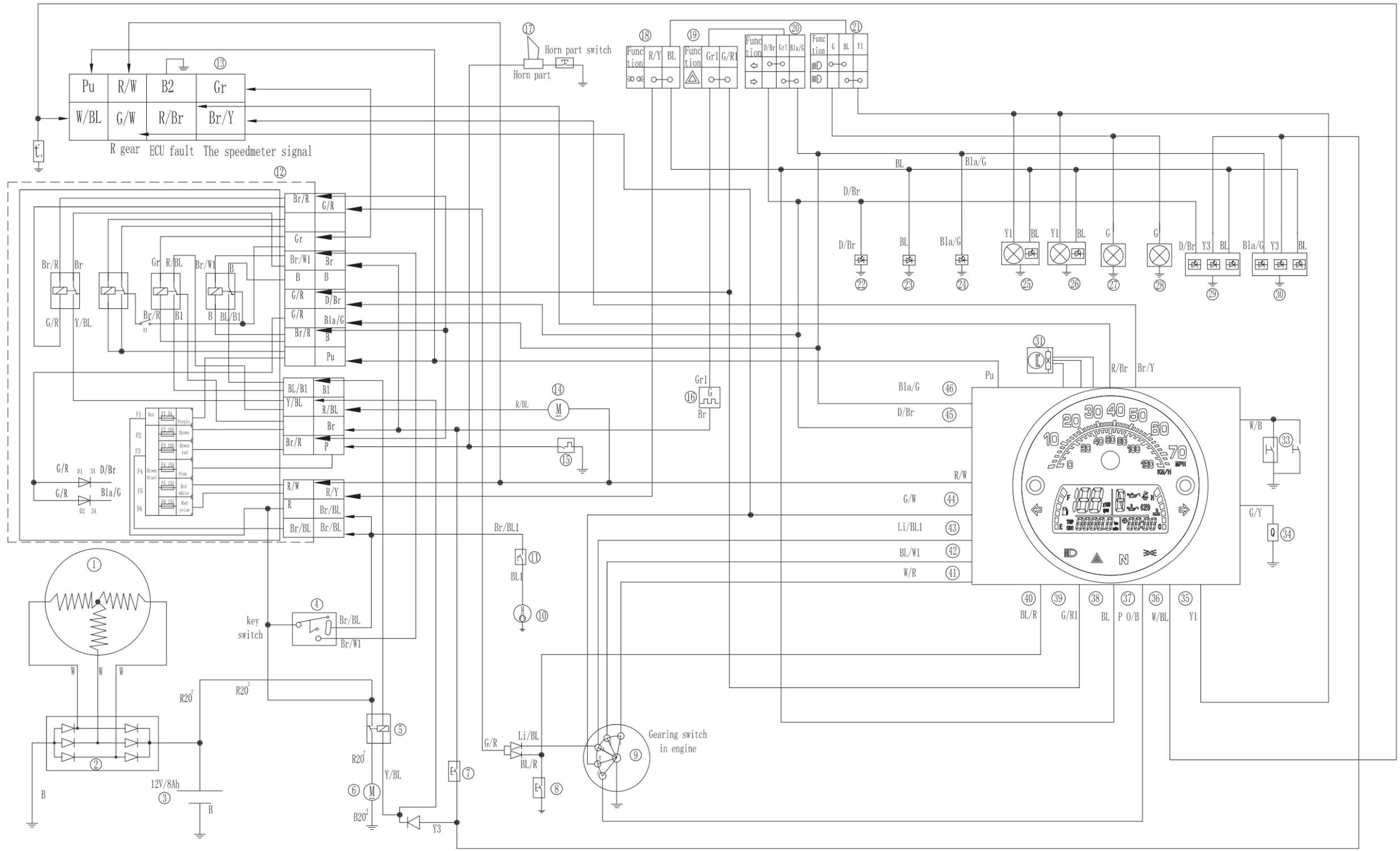
LIGHTING SYSTEM

HEAD LIGHT IS OUT OF WORK	
Head light is out of work	<ol style="list-style-type: none"> 1、 Improper bulb 2、 Too many electric accessories 3、 Hard charging(broken stator coil and/or faulty rectifier/regulator) 4、 Incorrect connection 5、 Improperly grounded 6、 Bulb life expired

TROUBLESHOOTING

BULB BURNT OUT	
Bulb burnt out	<ol style="list-style-type: none">1、 Improper bulb2、 Faulty battery3、 Faulty rectifier/regulator4、 Improperly grounded5、 Faulty main and/or lights switch6、 Bulb life expired
ERROR DISPLAY OF METER	
Wrong Speed	<ol style="list-style-type: none">1、 Then sensor on rear axle is damaged or polluted by iron powder2、 The connection between sensor to meter is wrong.3、 Broken meter

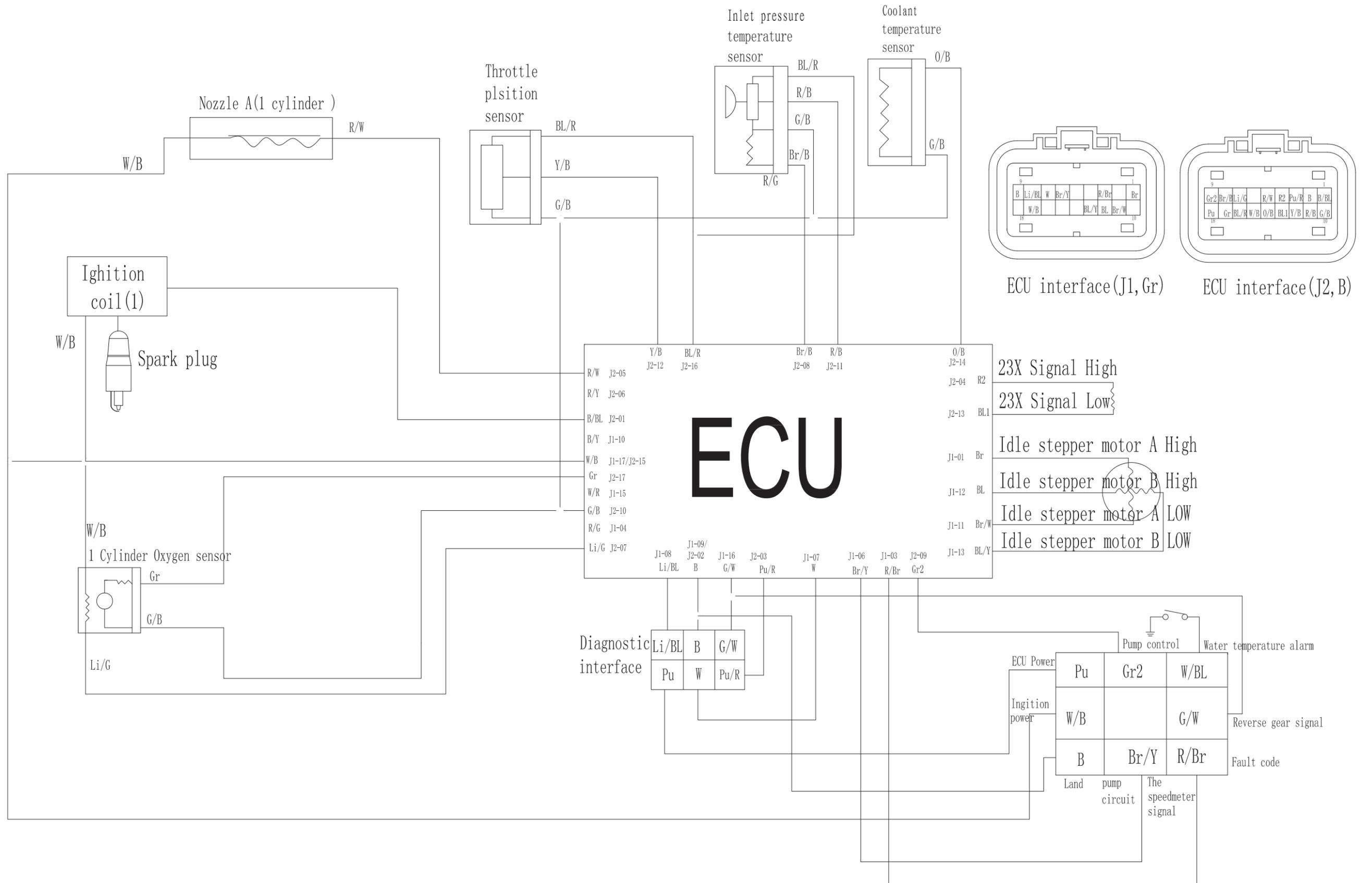
HS250UTV/HS200UTV WIRING DIAGRAM



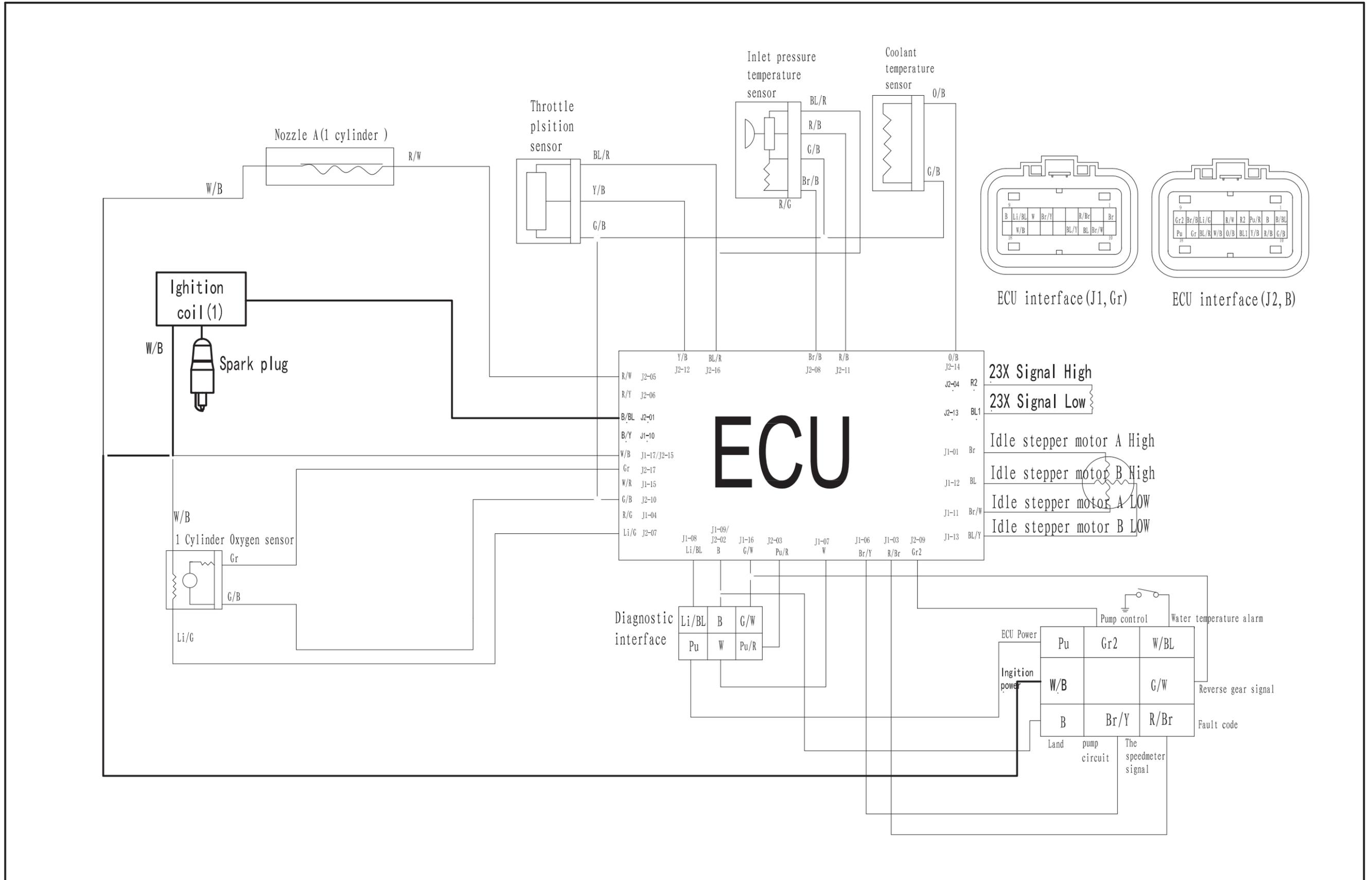
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|-----------------------|----------------------------|-------------------------------|--------------------------|--------------------------|------------------------|
| ① Magnetic motor | ⑨ Gear switch | ⑰ Horn part | ⑳ Front high beam light | ㉓ Safety belt switch | ㉗ L gear lamp |
| ② Regulator/rectifier | ⑩ Fan motor | ⑱ head light switch | ㉑ Front high beam light | ㉔ Fuel level sensor | ㉘ H gear lamp |
| ③ Battery | ⑪ Water temperature switch | ㉒ Emergency lamp switch | ㉓ Front low beam light | ㉕ High beam | ㉙ Neutral gear lamp |
| ④ Ignition switch | ⑫ Relay assy. | ㉔ Turn light switch | ㉔ Front low beam light | ㉖ Water temperature lamp | ㉚ Reverse gear lamp |
| ⑤ Starter relay | ⑬ TO ECU interface | ㉕ Low(high beam) light switch | ㉕ Front low beam light | ㉗ P gear lamp | ㉛ Right direction lamp |
| ⑥ Starter motor | ⑭ Fuel pump | ㉖ Front left turn light | ㉖ Front low beam light | ㉘ Position lamp | ㉜ Left direction lamp |
| ⑦ Brake switch | ⑮ DC auxiliary socket | ㉗ Licence light | ㉗ Front right turn light | ㉙ Emergency lamp | |
| ⑧ Parking switch | ⑯ Flasher | | | ㉚ Speedmeter | |

Note:
 R-Red Pu-Purple Li-Light W-White D-Dark Bla-Blackish
 Br-Brown Y-Yellow BL-Blue B-Black Gr-Grey P-Pink
 O-Orange G-Green

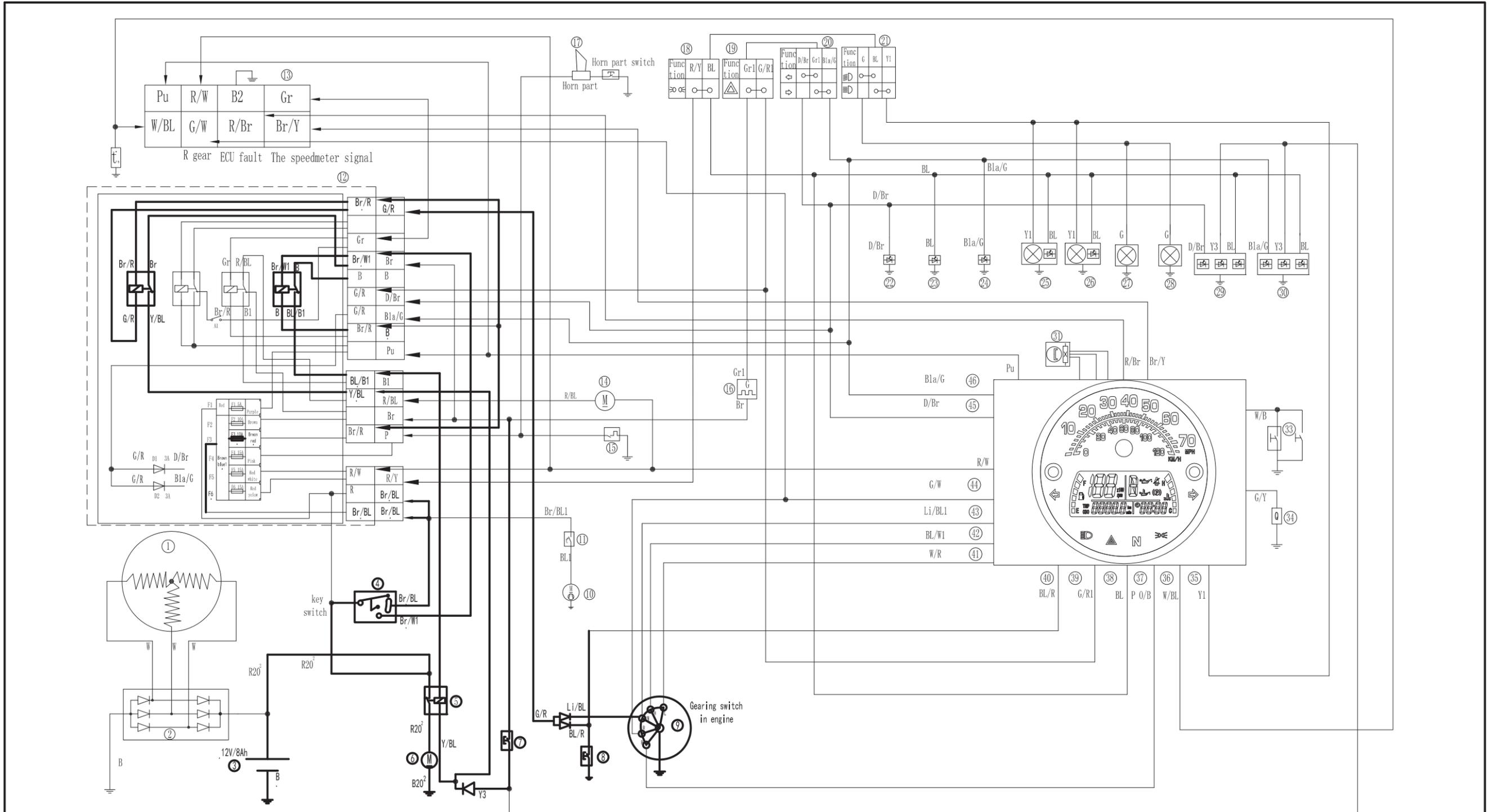
HS250UTV/HS200UTV WIRING EFI DIAGRAM



IGNITION SYSTEM CIRCUIT DIAGRAM

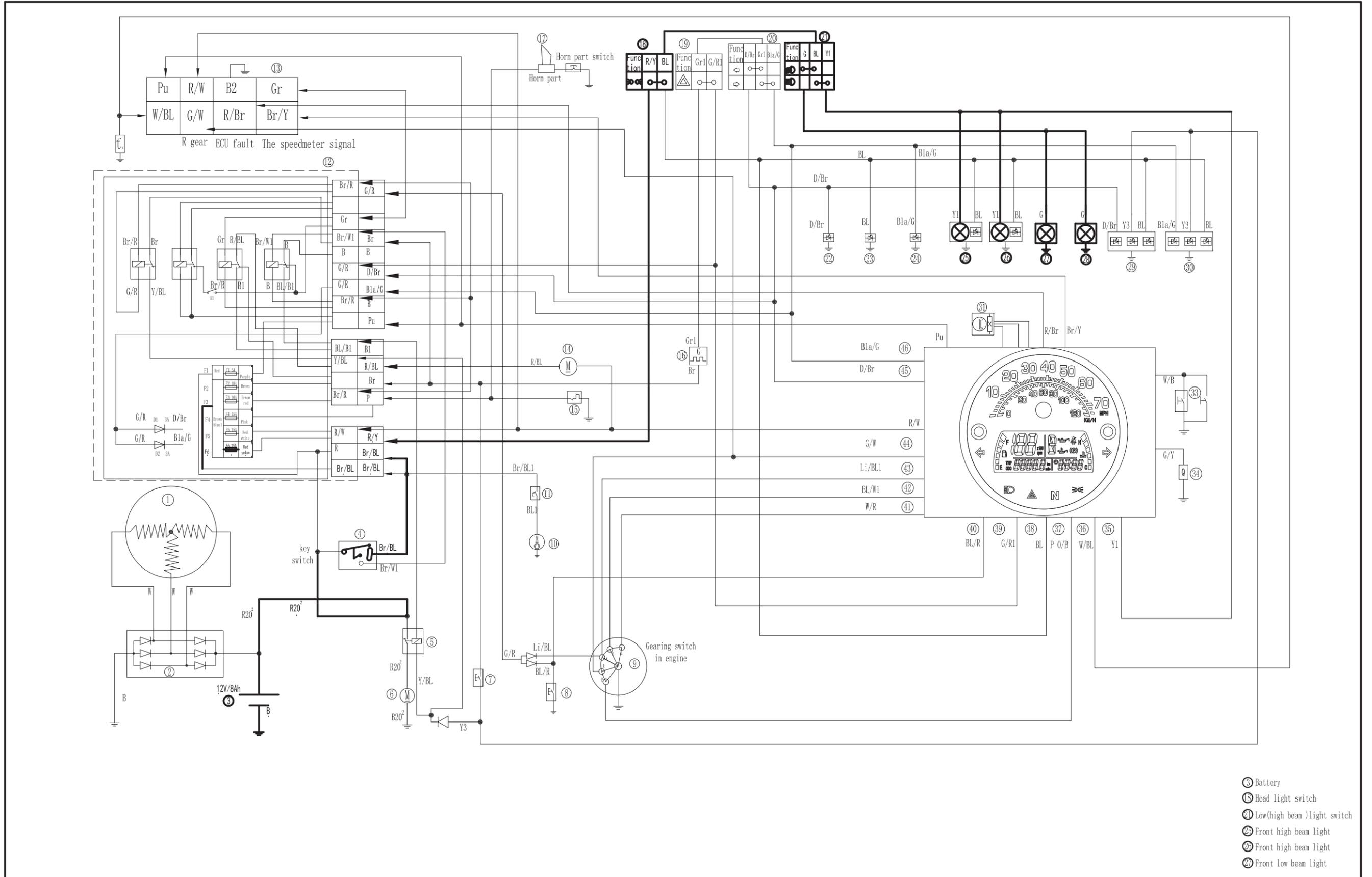


ELECTRIC STARTING SYSTEM CIRCUIT DIAGRAM

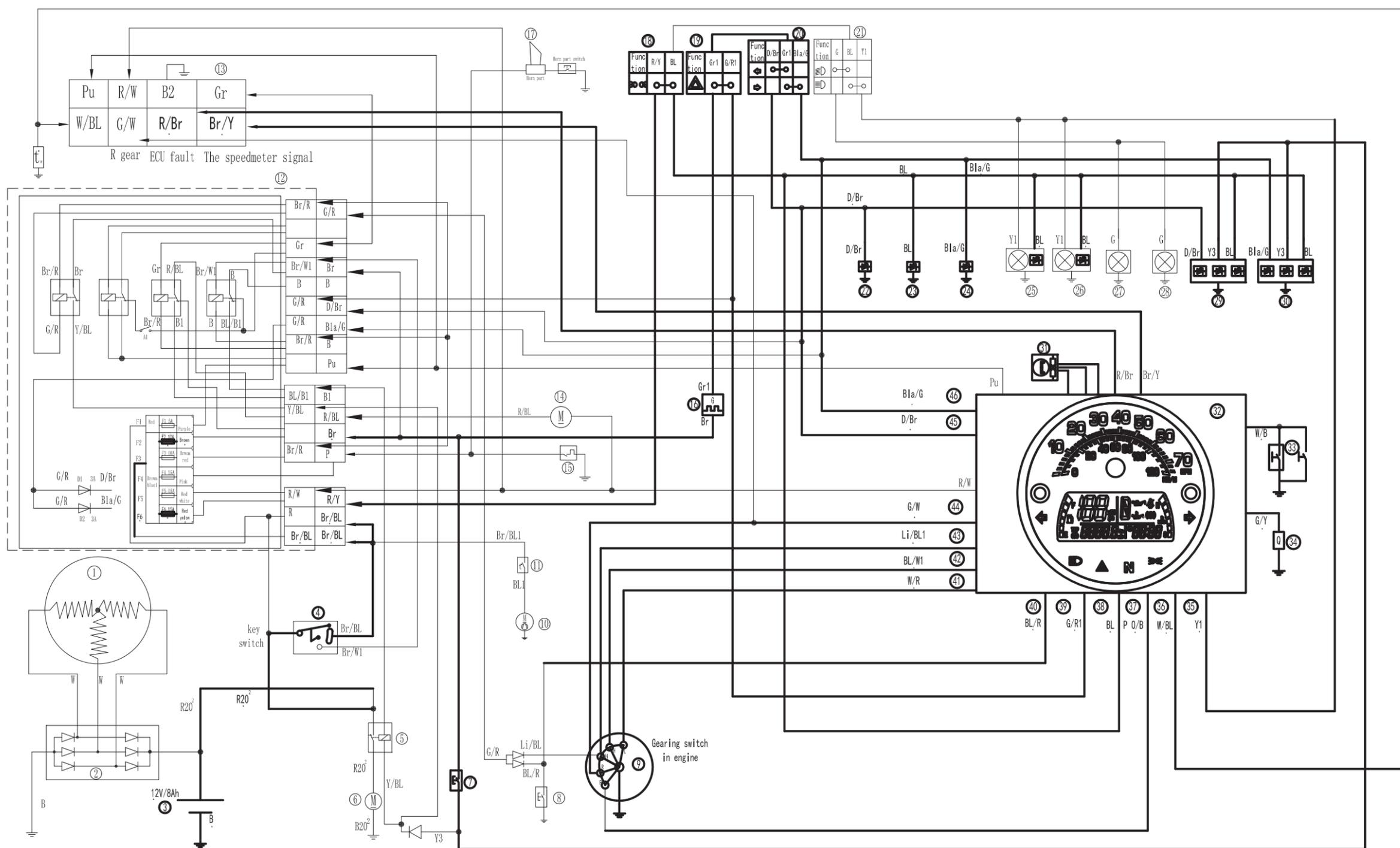


- ③ Battery
- ④ Ignition switch
- ⑥ Starter motor
- ⑦ Brake switch
- ⑧ Parking switch
- ⑨ Gear switch

LIGHTING SYSTEM CIRCUIT DIAGRAM

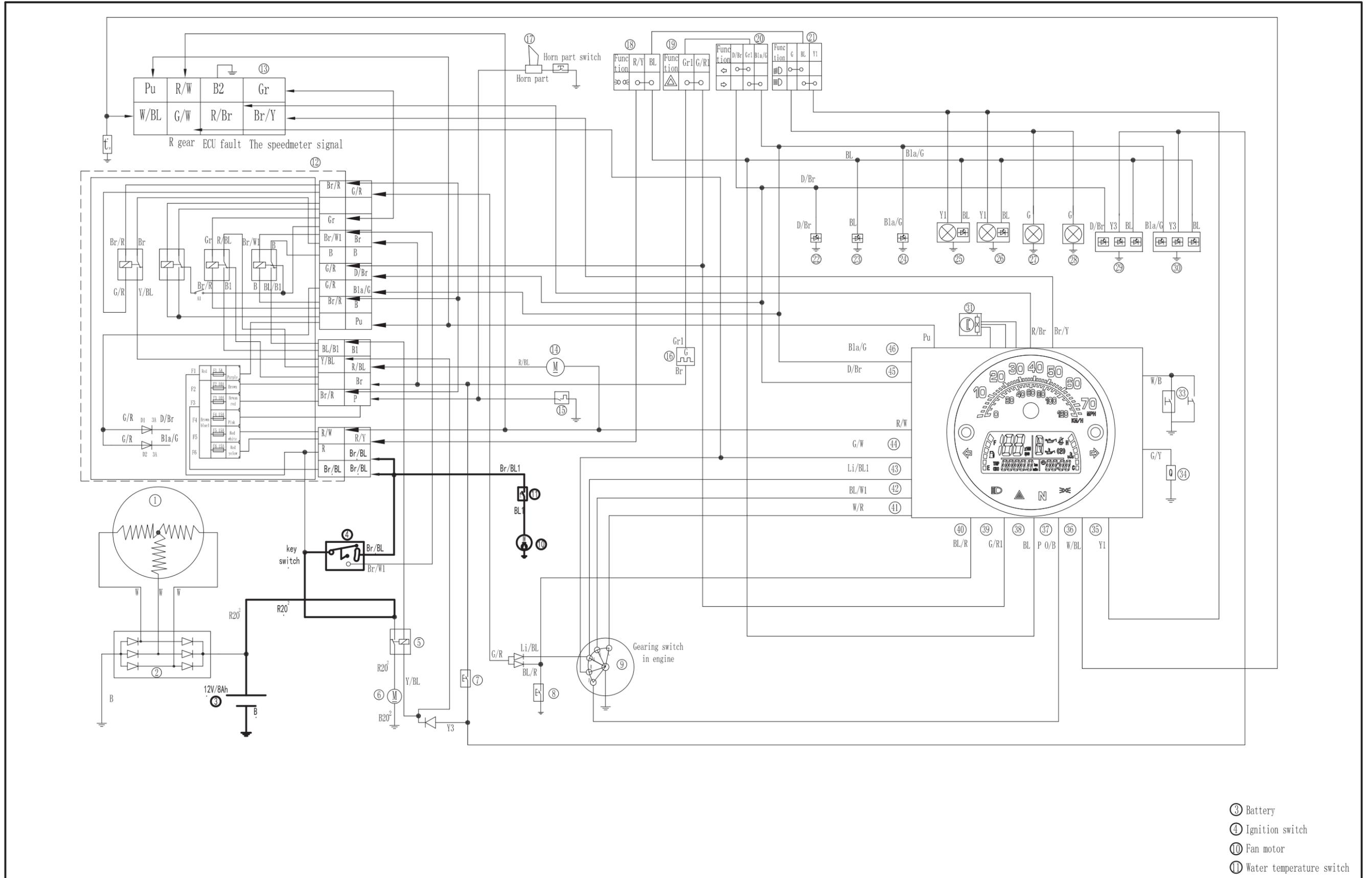


SIGNALING SYSTEM CIRCUIT DIAGRAM



- | | | | |
|-------------------------|--------------------------|--------------------------|------------------------|
| ③ Battery | ⑳ Turn light switch | ㉒ Speedometer | ㉙ Emergency lamp |
| ④ Ignition switch | ㉑ Front left turn light | ㉓ Safety belt switch | ㉚ Parking lamp |
| ⑦ Brake switch | ㉒ Liscence light | ㉔ Fuel leve sensor | ㉛ L gear lamp |
| ⑧ Gear switch | ㉓ Front right turn light | ㉕ High beam | ㉜ H gear lamp |
| ⑨ head light switch | ㉔ Front low beam light | ㉖ Water temperature lamp | ㉝ Neutral gear lamp |
| ⑩ Emergency lamp switch | ㉕ Front low beam light | ㉗ P gear lamp | ㉞ Reverse gear lamp |
| | ㉖ Speed sensor | ㉘ Position lamp | ㉟ Right direction lamp |
| | | | ㊱ Left direction lamp |

COOLING SYSTEM CIRCUIT DIAGRAM





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